

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

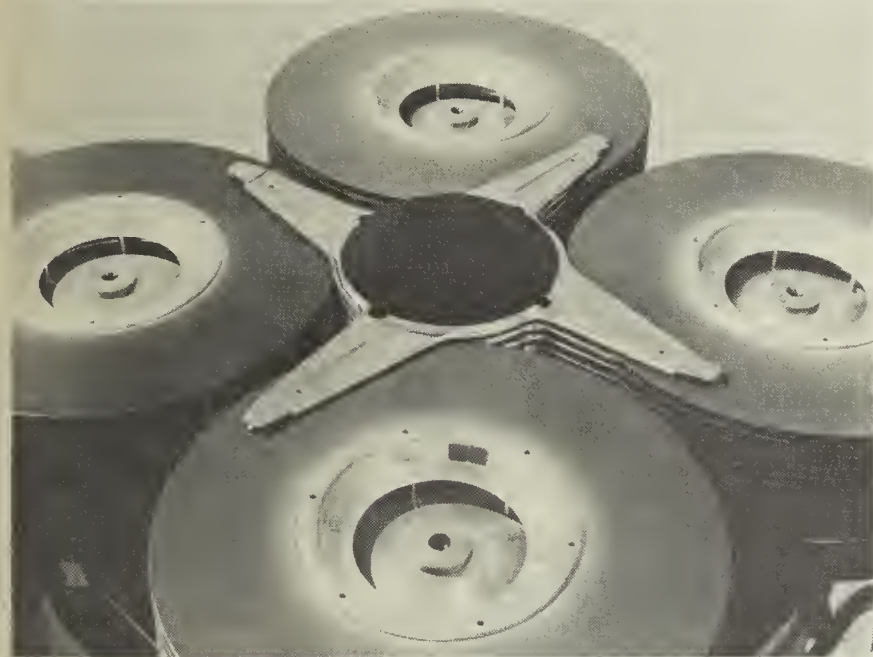
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The disk packs in this close-up of the STC 8800 disk module are removable only for servicing. The system is not plug-compatible with IBM.

Clustered Disk Packs Give 400M or 800M Byte/Unit

By Michael Weinstein
Of the CW Staff

LOUISVILLE, Colo. — The 8000 series disk storage subsystem from Storage Technology Corp. (STC) is designed as a replacement for the IBM 3330 disk subsystem in applications where users have high volumes of data with low to medium data accessing activity.

The 8000 series offers more storage at less cost.

The two models announced last week — 8400 and 8800 — have capacities of 400M and 800M bytes per unit. They are built with a cluster of disk packs (either two or four) surrounding a central read/write mechanism. Each disk pack has a storage capacity of 200M bytes, hence the 8400 has a centralized read/write mechanism in charge of two packs while the 8800 has four packs clustered. (These packs are an integral part of the drive and are non-switchable by the user.)

Each pack has 29 surfaces reserved for user information and programs, two surfaces for back-up and one surface for diagnostics to be used by the field engineer.

From the central head assembly, mul-

tiples arms extend like phonograph record player arms over the disk surfaces. These arms hold the read/write heads and move like the record arm laterally over the disk surfaces. One central shaft mechanism can control either two or four arms.

A total STC disk subsystem is comprised of an 8000 Disk Control Unit, up to eight 8800 or 8400 disk modules and an 8001 control module when an inter-

(Continued on Page 4)

Using KDMUs

B3500 Sites Can Compare Performance

By Don Leavitt
Of the CW Staff

HOUSTON — Managers of Burroughs-based installations now have a tentative standard by which they can compare their performance, in dollars and cents figures, with the "average B3500 site."

The average B3500 site apparently spends 61 cent/KDMU (kilo direct memory units) to get its work done, according to John K. Paden, president of Paden Data Systems of Dallas.

Statistic Tabulated

The KDMU is a statistic generated by the Tabs job accounting software provided with each medium-scale Burroughs system. It is calculated by multiplying the size of each application program, measured in thousands of digits, by the direct CPU time needed to execute it.

Reporting to the meeting of Cube (Co-operative Users of Burroughs Equipment) held here recently, Paden said his "standard" figure was based on reports of 39 B3500 installations, covering their operations during July. The total number of KDMUs reported by all sites was divided

Case 'Backward'

Bork Has Opposed Concept Behind IBM Antitrust Suit

By E. Drake Lundell Jr.

CW Washington Bureau

WASHINGTON, D.C. — "The government's suit (against IBM on antitrust grounds) stands revealed as an attack on outstanding commercial success as such."

That may sound like a quote from a high executive from IBM or from one of the army of lawyers now defending IBM against the government's almost five-year-old antitrust case, but it isn't.

It's a quote from Solicitor General Robert H. Bork, now acting attorney general and the man now charged with pursuing the IBM antitrust case, in the wake of President Nixon's firing of special Watergate prosecutor Archibald Cox and the subsequent resignation of Elliot L. Richardson.

Bork has long been known to feel the government's case against IBM was unfounded, because of his stated belief that IBM attained its position in the computer industry through superior efficiency.

Case Backward?

In an article in the September 1969 issue of *Fortune* magazine, Bork charged the government had the case "backward" for all practical purposes.

The figures quoted in the government's complaint — which showed that IBM had between 69% and 80% of the general-purpose computer market — just showed that IBM had superior efficiency over its rivals in the market, he said.

IBM's practice of selling computers and

software together as a package — a practice said to be anticompetitive in the government's suit — did not restrict the ability of other firms to compete since they could adopt the same practice if they chose to do so, he said in the article written while he was a professor of law at Yale University.

Instead of being anticompetitive, he declared bundling was the most efficient way to conduct business in the computer industry.

On his appointment last year to solicitor general, the third highest slot in the Department of Justice, Bork was questioned carefully by the Senate Judiciary Committee on his position vis à vis the IBM case. He replied he would carry the government's case to the Supreme Court if the case went that far (the solicitor general tries all of the government cases before the high tribunal).

Would Do His Job

He did not endorse the government's position in the IBM case, however, he only promised to carry out his role as solicitor general in the case as best he could.

But now times have changed and Bork — at least temporarily — is in a position to take some action with regard to the government's suit against IBM.

There are three reasons that would work against his calling off the suit entirely, Washington sources noted last week, but

(Continued on Page 2)

In Dollars and Cents

how much core it has, Paden said in explaining his findings. The most cost-effective site he found had a cost of 31 cent/KDMU and only 120K of memory. But it was used 709 hours during the month, or more than 23 hr/day.

The largest system, with 360K memory, cost 39 cent/KDMU and was used 423

(Continued on Page 4)

On the Inside This Week

OS/7 Memory System Gives Virtual-Like Use —Page 13

Basic IBM Ruling Unchanged— Problem in Appeals Process —Page 33

Communications15
Computer Industry33
Editorial10
Financial46
Software/Services13
Systems/Peripherals29

Comparison of Cost/Performance by Industry

User Type	Number of Sites	Average Cost /KDMU
Medical	4	\$.33
Business	8	.50
Service Bureaus	3	.55
Average for All	39	.61
College	2	.65
Insurance	3	.70
Banks	16	.75
Government	3	1.01

CPU Use Vital

The number of KDMUs generated during a month appears to be more a factor of how much the CPU is used than of

★
Is It Garbage Yet?

CW's Supplement
On Computer Output
Starts on Page 19



\$25 Million/Yr Budget**Options: In-House or Outside****Ontario to Prove Its DP Is Cost Effective or Dump It**

By Vic Farmer
Of the CW Staff

TORONTO, Ont. — The Province of Ontario, presently spending \$25 million/year on DP services, has taken a major step to insure all provincial agencies will get the best DP services for the least amount of money.

By 1975, governmental department heads will be able to solicit bids for their DP operations from either a consolidated provincial computer service center or any commercial outside supplier under a reorganization plan initiated by the Committee on Government Productivity.

In addition to giving government departments more cost-effective systems, the province expects this open competition will "provide a basis for the government to evaluate whether it should be in the

EDP and systems business at all," according to W.W. Petryniak of the Management Board Secretariat, a group established to oversee the consolidation effort.

Previously, department heads were required to be self-sufficient and develop and use their own in-house data services exclusively. This policy of self-sufficiency resulted in a highly decentralized in-house organization for the development of systems — 400 systems people under 20 different managements — and a partially decentralized in-house organization for computer processing — four computer centers with three 370/158s, a 360/65, a Univac 1106, two Honeywell CPUs and several smaller computers in use or on order.

The DP budget climbed from \$2 million to \$25 million in six years and will continue to grow at 20% per year, Petryniak said.

But during those six years, the DP

equipment, systems and consulting services offered by outside suppliers have become plentiful and sophisticated, he noted, and "rather than building on our existing organization and policies, a major change of direction" was deemed necessary.

There are six basic concepts to the Ontario plan:

- Establish one governmental DP agency to provide computer services, systems development services and management consulting services on a cost recovery basis but in competition with outside suppliers.

- Centralize all existing computer installations, systems personnel and management consulting operations under one DP agency.

- Send all systems projects, management consulting projects and computer processing of applications out for bid, but one of the bids must be from the

DP agency.

- Appoint systems coordinators and specialists to assist program managers and senior management to effectively utilize system techniques and system resources.

The systems coordinator will be part of the management team of the department and will help managers identify the department's needs, coordinate system activities and act as the bridge between department management and the technical world of systems and EDP, both in-house and outside.

- Establish a tightly controlled budget review wherein the department manager must justify the need for DP services as he must justify all his other expenses.

- Set up one management board with overall responsibility to oversee the use of DP in the government including the development, monitoring and implementation of government-wide policies for systems and data processing.



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Bork Opposed Antitrust Suit Concepts

(Continued from Page 1)

in this Watergate-plagued town no one was ruling out even that possibility altogether.

- Most sources believe it is unlikely that Bork would be named as permanent attorney general because of his role in the firing of special prosecutor Cox, and Bork's influence may only be temporary.

- The Justice Department has invested five years in the case and Judge David Edelstein, who is hearing the case, is likely to set a tentative trial date for it soon, the sources said, noting there would be a lot of internal pressure within the

department to go on with the case at this late date.

- These sources stated there was too much public and congressional pressure against calling off the case without generating a hue and cry from the public and the industry.

However, legal personnel in Washington said that if Bork stays in power for a long period — while the furor over impeachment and other matters remains hot — he could seriously hurt the case by cutting resources to the antitrust division team handling the case.

There have been some efforts in the past

year to get the budget of the antitrust division beefed up, these sources said, but with an acting attorney general who is not very keen on most antitrust matters that may now be impossible, they indicated.

If Bork is nominated to fill the role of attorney general or if he is acting attorney general for an extended period of time, the case may well be downgraded within the Justice Department to such an extent that it could be dropped — or at least to the extent that the department would want to negotiate a consent decree with IBM, they added.

"This would seem to be the perfect time for IBM to open up negotiations for a relatively weak consent decree," one attorney said.

"The acting attorney general is on their side in the case, the Tunney bill (which would open up negotiation on consent decrees for public scrutiny) still has not been finally passed by Congress and with all of the other political maneuvering in Washington such a decree would hardly be noticed — especially if it seemed favorable to the government," he added.

Antitrust Division Lawyers Worry About Future Goals

By E. Drake Lundell Jr.
CW Washington Bureau

WASHINGTON, D.C. — The elevation of Robert H. Bork to acting attorney general and the resignation of Elliot L. Richardson and firing of William D. Ruckelshaus may bring about a collapse in morale within the Justice Department and increased political pressures — particularly on the antitrust division, a high Justice official indicated in a restricted attendance group meeting here last week.

The official, intimately connected with the Justice Department's Antitrust Division, said: "A week ago I planned to tell you of our planned vigorous prosecution of antitrust cases in the next few years, but now I can't tell what will happen."

The effect of the President's move will be largely a psychological one on the department and the members of the team who are preparing antitrust cases such as the one against IBM, he indicated, although he refused to speak directly about the IBM case or even mention the name of IBM before the group.

This psychological effect will come about because Richardson was "dedi-

cated to free and unfettered prosecution of all cases within the department without regard to political motivations," he said.

"I believe we have the people to meet this goal," he added, "but the Justice Department must be free from all political influence over the hard decisions that will have to be made on the cases before the courts."

The Justice official did indicate he presently thought Bork would not alter the basic course of the department or the basic policies it has been following in the antitrust area but he could not predict the future.

Just two weeks ago the Antitrust Division had been reorganized by Richardson to give more emphasis to planning and budgeting functions and to bring more economists onto the staff — an important element in all antitrust cases, he said.

At the same time more money had been budgeted to fighting cases in areas where there were entrenched competitors, he said, but now he indicated he did not know if those increased allocations would actually be forthcoming.

Just One Name Is Not Enough

WASHINGTON, D.C. — Indonesians have a lot of trouble with computers — at least as far as their names go — since each Indonesian is given only one name at birth which is not connected to a family surname.

Since most computers are programmed to accept a first and last and sometimes a middle name, school applications are of-

ten returned as incomplete to Indonesians seeking an education abroad, according to Wirjono, the first secretary to the Embassy of Indonesia.

Other problems involved are the impossibility of an accurate census, postal service mix-ups, and confusion over the same name given to two persons when government papers or documents are reviewed.

Mysterious Breakdown Ails Air Canada CPUs, Univac Noncommittal

TORONTO — A computer breakdown at first attributed to a "gremlin in the computer" caused a shutdown for four-and-a-half hours at Air Canada's Toronto office last month. The unspecified hardware failure that resulted in a "mysterious loss of data" made it impossible for Air Canada passenger agents to sell tickets, book flights or check arrivals, departures and availability of seats, according to Brock Stewart, public relations officer.

The breakdown of the computers — three Univac 1108s — affected the complete system worldwide, according to Stewart. While there were considerable problems in Toronto, which was hit from 6:30 p.m. to 11:00 p.m., the London office, tied into the same computer system, suffered relatively little confusion. Its breakdown came in the middle of the night, when there wasn't such a demand on reservations agents, Stewart said.

A spokesman for Univac said the firm had nothing to add to its customer's statement on the cause of the breakdown.

The system normally can handle up to 90,000 bookings a day, making reservations at hotels throughout the world or predicting within 1% the number of passengers who will show up for a flight.

Reprogramming Needs Vital

Firm's Negotiators Must Keep DP Staff Informed

By Don Leavitt

Of the CW Staff

CHICAGO — Organized labor, particularly if the company has several locations or several types of operations, involves contractual negotiations, and unless the company negotiators keep in touch with the DP staff, the company may find it has agreed to terms it will be unable to implement within a reasonable time because of heavy reprogramming needs.

Robert A. Bulen, manager of business services for John Deere & Co., also told the recent meeting of the Society for Management Information Systems that businesses often have a difficult, if not impossible, time forecasting the effect of outside influences on their own decision-making processes, but there are remedies to ease some of the impacts.

Government regulations, out of Congress or the Executive branch, are often unpredictable, particularly — as Deere discovered — if coupled with a company's becoming involved with a whole new product line. Bulen noted that Deere has been a heavy equipment producer, and to simplify record-keeping, hadn't been posting to its files the price of any items that were less than \$1,000.

This worked well until Deere added bicycles, snowblowers and snowmobiles and government regulations required they

be able to notify each individual purchaser in case of a recall. The alternative, Bulen noted, would be national advertising to tell affected owners of the possible problem, and that would be both expensive and potentially damaging to the company's image.

The reporting requirements of the Occupational Safety and Health Act (Osha) also had an unforeseen impact on most manufacturer's systems, Bulen continued. The need to monitor each employee's exposure to hazards has meant a massive resystemization of the company's payroll and personnel system, he explained.

Watch the Legislation

But if regulations are often imposed abruptly, they are often preceded by some indicators as, for example, when enabling legislation is being prepared or discussed in the appropriate government body.

With that in mind, Deere now has someone assigned to watching the progress of any legislation or rule-making that might affect the company, and the Management Information System Group is "in" on the first evaluation.

That way, Bulen said, even if Deere can't predict the final form of potential new regulations, at least the company can plan the most likely course of action that will be required.

Check Information Flow

Within Deere, a different sort of effort is made to insure that management at various levels has what it considers enough information to do its job. Every five years or so, the firm interviews employees to see what they feel they need, if anything, in the way of more information to do their job.

The questionnaire used is designed as a prompter, asking first a series of ques-

tions in the form, "do you need more information from the XXX department?", and then, "what do you need from the XXX department?"

The answers are discussed with the respondents' supervisors who can confirm or deny the value of the suggestion. Having recently completed interviews with 170 managers, Bulen said he felt Deere was currently providing them with 60% of the information they need. Another 20% is not related to anything the DP staff could provide but which subscriptions to *Wall Street Journal* might, he said.

The final 20%, Bulen thought, appeared to be of general interest to managements of many companies and ought to be available in some DP-usable form from an outside source. U.S. Census data, available in this way, is an example of this final type of data the managers feel they need, Bulen noted.

Confidence is dealing with the world's largest independent peripheral manufacturer.



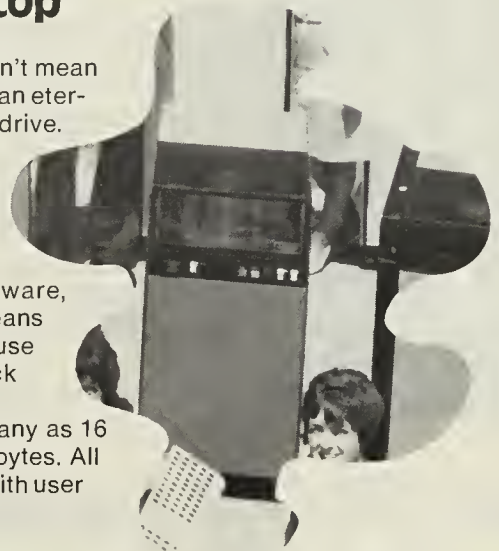
Ampex solved the "disk delay" puzzle with fifteen-second start/stop

Passage of time is a relative thing. A minute doesn't mean much on your lunch hour, but sixty seconds can be an eternity when you're waiting to change packs on a disk drive. That's why Ampex developed the DM-330 Disk Drive with 15-second start/stop. To cut down the time you stand in one spot, eyes glued to a rotating pack, waiting for it to coast to a stop.

Part of the complete DS-330 Disk System, the DM-330 is plug-compatible with IBM's 3330 hardware, costs less and works harder. Waist-high loading means your DP people can give up weight-lifting. And because the air shield lifts away with the flip-up top, disk pack changing is a simple matter of slide-and-twist.

Our DS-330 System Controller can handle as many as 16 DM-330 drives for an all-up capacity of 1.6 billion bytes. All with an average access time of 28 milliseconds, all with user convenience, all with Ampex accuracy, reliability and quality.

When it comes to Disk Drives and complete Disk Systems, Ampex has all the pieces. Call toll-free 800-421-6554 to find out how they fit in your data processing installation.



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Program Aims to Make Best Use of Land

PAINESVILLE, Ohio — Working with data supplied by state geologists and the Northeast Ohio Areawide Coordinating Agency (Noaca), a computer is charting future land use based on the terrain's flaws and assets.

For example, it maps out areas where development would be limited by poor drainage or little well water. The computer program also singled out an area for low-density construction because of flooding.

Sand and gravel extraction sites and sanitary landfills are also pinpointed in the computer mapping.

The system is presently being used to study the area around Madison, with a study of the entire Lake County scheduled for completion by next summer, according to Noaca planner David D. Lavelle.

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Clustered Disks Give 400M or 800M Byte/Unit

(Continued from Page 1)

mix of 8000 series and 3330 type disks is required.

More Arms, Quicker Accessing

The requirement for mixing the newer high density disks with STC's 3335 (IBM's 3330 equivalent) could get around the problem of data disk contention. Frequently used information could be placed on the STC 3330 equivalent where one set of arms would only have to scan 100M bytes of data as opposed to the 200M bytes each of the 8000's arms accesses.

But for such a system, the user has to use STC 3335s as he cannot mix IBM's 3330s in an STC 8000 subsystem.

Both 3335 type and the newer 8000 disks would operate through the same STC controller.

A potential problem with the STC disk can arise when one of the sets of arms crashes. In this case all spindles sharing the same central mechanism are down. STC has minimized this threat by designing lightweight arms and using the two spare surfaces for back-up.

The heads on the 8000 series load with a force of 15 grams each as opposed to about 375 grams for IBM 3330 heads. Tests taken by STC involved running their disks continuously while physically hitting the head to force it to make contact with the disk surface every minute or two. In every case, an STC spokesman said, there was no physical damage to the disk surface and all that was required to resume normal operation was to power on.

If for some reason a given surface does become inaccessible, the user can designate one of the spare surfaces to take its place. All addressing translation to the designated spare is taken care of by the subsystem and is transparent to the host computer, the spokesman added.

More Per Seek

A special tracking scheme allows the host computer to transmit up to 1.5M

Models	IBM		STC	
	3330	Mod II	8400	8800
Storage Capacity (M byte)	200		400	800
Bit Density (bit/in.)	4040			
Track Density (track/in.)	250			
Bytes/track	13,030			
Recording Surfaces	19		58	116
Access times (μsec)	10 min 30 av 55 max		7 min 27 av 50 max	
Transfer Rate (kbyte/sec)	806			

IBM's versus STC's specifications.

bytes on one seek using the 8000 series disks as opposed to a maximum of 247K bytes on the IBM 3330s.

This is accomplished by sectoring the 8000 series disk surfaces into concentric circles — each composed of 69 tracks. By judicious setting of data on disk, the 8000 series user can draw data from each disk in turn going around the central shaft mechanism, the spokesman said.

Another design advantage over the IBM 3330 series, according to STC officials, is

the use of parallel control paths to each 8000 series spindle. Under the IBM design there are two paths, one controls the use of the first four disk boxes while the second controls the second four boxes. Under this plan the only way a user can make simultaneous accesses is if one access is from the first set of four boxes and the second is from the latter section.

Simultaneous Access

STC has set up their parallel accessing paths so simultaneous access can be made from any two boxes in the subsystem.

Parallel switching also adds reliability in that if one drive fails, the others are not affected.

The STC disk subsystem will operate on any 370/135 and up under OS (release 21.6 and up — treated as a 3330-I); DOS (release 27 and up — treated as a 3330-I); and VS1 or VS2 (treated as a 3330-II).

The 8000 disk subsystem is tied to a block multiplexer channel so it will also operate on the 360/85 and the 360/90 plus the 370/135 and up.

In both the 360s and 370s, no changes are required in the IBM software and

IBM		STC	
3330 Model I	8000 Series		
1 3830 \$1,723	1 8000 \$1,425		
1 3333 \$1,385	2 8400 \$1,800		
3 3330 \$3,276			
\$6,384	\$3,225		
3330 Model II	8000 Series		
1 3830 \$1,723	1 8000 \$1,425		
1 3333 \$1,850	1 8800 \$1,400		
1 3330 \$1,550			
\$5,123	\$2,825		

Comparison of monthly rental charges on two-year lease plans using four different configurations with 800M byte capacity.

there are no problems with IBM maintenance, according to an STC spokesman.

The STC disk subsystem contains a processor which is controlled through a microcoded floppy disk. When operating with an IBM mainframe, the subsystem emulates an IBM 3330 subsystem on the CPU multiplexer channel.

Delivery is set for fall 1974 with plans for later versions to be compatible with non-IBM mainframes. STC is located at 2270 S. 88th St., 80027.

B3500 Sites Can Compare Performance

(Continued from Page 1)

hours during the month, or about 14 hr/day. The lightest workload produced the highest unit cost: \$5.30/KDMU. This installation logged only 172 hours during July, or less than 6 hr/day, Paden noted.

The average configuration among the 39 participating sites had 150K bytes of memory, 100M bytes of disk storage and 4.5 magnetic tape drives. Sixty-three percent of the disk units had 23 msec access, and 51% of the tapes were 800 bit/in.

Only half the installations had a card punch linked to their systems. The average hardware cost was \$107 per thousand bytes of main memory, or \$16,050 monthly rent, Paden estimated.

More than 90% of all programs were in

Cobol and 57% of program debugging was done "hands-on." On the other hand, 75% of all productive work was handled in batch mode, and only a quarter of it in on-line mode; 72% of all files were organized sequentially, he added.

The average installation was manned by 7.6 operating people who worked in 13 scheduled shifts covering 126 hours each week. The system logged an average total of 497 hours, or 67% of all available time, during July. Fifty-eight percent of all productive work, incidentally, was done between 4 p.m. and 8 a.m. on Monday through Friday.

36,000 KDMUs

An average of 2.9 jobs was run concurrently

on these multiprogramming machines and they averaged 455 job/day. Paden estimated the average job used 16.7% of memory. All of this work produced 36,000 KDMUs of productive work during the month.

While the heaviest workload can be processed at the least unit cost, this is not always the case, Paden went on. Banking and insurance users, for example, have traditionally high-volume workloads, but the study found their costs markedly above the average.

Government sites had the worst average cost (\$1.01/KDMU) while medical installations had the best, at 33 cent/KDMU.

Paden is interested in hearing from other medium-scale Burroughs users, in order to make the current year-long study as conclusive as possible.

FTC Charges 'Deceptive Ads,' CDC School Screams 'Foul'

By Toni Wiseman
Of the CW Staff

WASHINGTON, D.C. — The Federal Trade Commission (FTC) is taking Control Data Corp. to court over a complaint whose terms, CDC maintains, were fully complied with over a year ago. The complaint, issued May 2, 1972, charged Control Data Institute (CDI) with "deceptive and unfair" advertising and sales practices [CW, May 10, 1972].

CDI had 10 days after the complaint was filed to enter into consent negotiations with the FTC.

Such a consent order would not have been an admission of guilt, but rather an agreement

for CDC not to engage in the challenged practices in the future.

However, a consent order was never agreed upon and the matter will now go before an administrative law judge. No date has been set for the hearing.

The FTC complaint alleges that Control Data used "advertisements and sales practices that are deceptive or unfair to induce persons to pay over substantial sums of money to purchase courses of instruction whose value to the purchasers' future employment was virtually worthless."

It further challenges Control Data's claims that graduates of CDI will qualify for DP positions at salaries that "match or exceed the salaries of most recent college graduates."

"We will vigorously contest the charges in the commission's complaint," William C. Norris, chairman of the board of CDC said last week.

"We voluntarily implemented full compliance with the FTC requirements. The commission unilaterally rejected our efforts, without any notice or opportunity to comment of any kind,

after a full year of total silence following the submission of our proposal," Norris said.

"We've long since discontinued those ads," a spokesman for CDC said, referring to the deceptive advertising charges. "Some of them have not been in use for several years. So our position is that these questions being raised are academic," the spokesman added.

The FTC complaint calls for the alleged misrepresentations to be halted. In addition, CDI must keep records available for inspection by the commissioner's staff which will substantiate claims as to graduate placement, etc.

The complaint further asks that each student be given a packet providing certain information, such as percentage of the placement rate and identification of firms who are currently hiring graduates and their salary rate, as well as the number of enrollees who do not complete the course.

Two other computer programming schools were similarly charged in 1972. Both schools are still negotiating consent orders with the FTC.

IBM Gal For N.Y.C. Mayor?

NEW YORK — The computer industry is physically jumping into the political arena here — in the person of Fran Youngstein.

Youngstein, an IBM DP division marketing instructor, has declared her candidacy for Mayor of the City of New York. She is running as the Free Libertarian Party Candidate.

Her platform includes decentralization of City Hall, the repeal of all laws restricting prostitution, pornography, drug use and abortion, and the elimination of city income and sales taxes.

Computer Gets Its Man

BROOKLYN PARK, Minn. — From two-thirds of a license plate number and a description of a man and a car, the Brooklyn Park Police Department's new computer (Uniscope) led authorities to a man who allegedly kidnapped two 13-year-old girls and took indecent liberties with them.

Police investigator Robert Bozovsky spent over three hours running 244 possible license plate combinations through the computer, until one of the combinations finally fit the girls' description of the man and his car.

Grace Hopper Honored

PHILADELPHIA, Pa. — Cmdr. Grace M. Hopper, USNR Ret., has been elected to the National Academy of Engineering. She has also been awarded an honorary degree of Doctor of Science by the C.W. Post Center of Long Island University, and the Legion of Merit by the U.S. Navy.

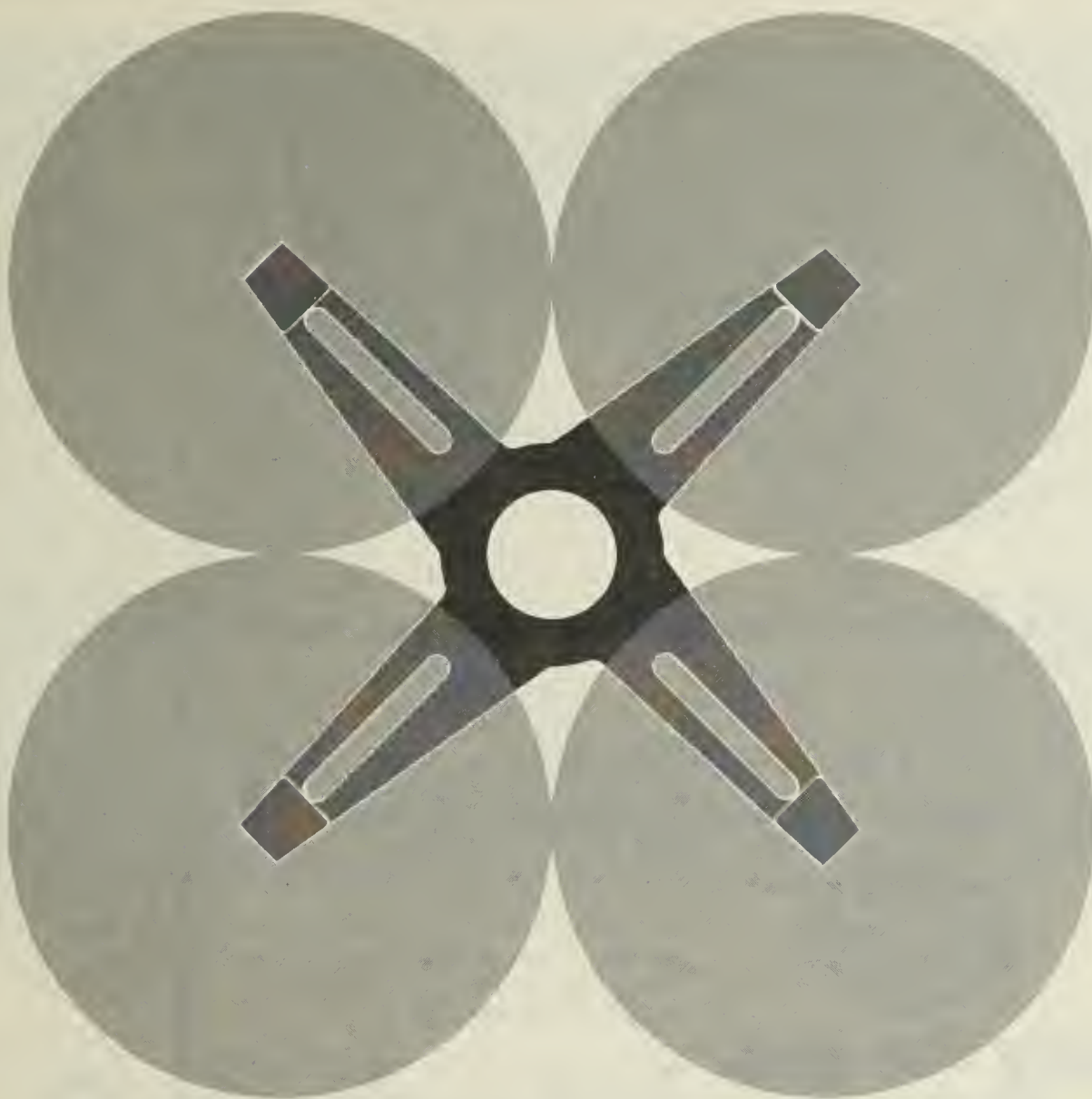
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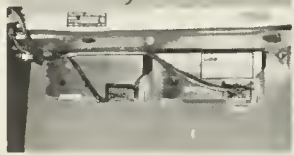
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- Install air conditioning, heating and humidity control systems in the center which are independent of those for the rest of the building.
- If the center uses the building's air-conditioning system, equip all air-conditioning ducts through walls with fire dampers which can be closed in the event of fire or smoke in other areas.
- Locate the air-conditioning system's outside air intake well above ground level to prevent drawing in smoke, dust, fumes or corrosive vapors and to protect against vandalism.
- Ensure that all conductors, such as water pipes, heating and air-conditioning ducts, are electrically grounded at a point near the computer room.
- Choose non-combustible floor covering in the computer room which is designed to prevent the buildup of static electricity.

- Use masonry walls, steel beams or rods, or mesh in walls to shield the computer center from radar signals from external sources.
- Remove all unused wiring from the computer room.

This checklist was compiled by DCF Systems Ltd., 74 Victoria St., Toronto, Ontario M5C 2A5.

Push Button, Sell Hog!

WASHINGTON, D.C. — "Going once, going twice..." The Agriculture Department is exploring the possibility of helping arrange an "electronic price negotiating system" to help farmers sell hogs.

Farmers would have a telephone number through which they could offer their hogs for sale. The offer would be put on a computerized communications system that would go into the offices of meat packers.

Every few seconds, the offering price would be reduced by a specified amount. The first buyer to press a button at his terminal would get the hogs at the selling price then indicated provided the price was above the minimum price the farmer indicated he would take.

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- Can be installed and operational in one day on your IBM, CDC or UNIVAC computer
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- Comprehensive training programs and documentation
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Death Traps Tripped Up

MONTGOMERY, Ala. — The state Highway Department here is using a computer and a Correct (Cost-benefit Optimization for the Reduction of Roadway Environment-Caused Tragedies) program to make driving in Alabama safer.

The computer is fed data on statewide accident reports and highway conditions at the time of the accident, as well as suggestions for correcting or eliminating the road hazard.

The program then selects the correction which would best eliminate the "death trap."

Correct has already dealt with the "top 80" death traps in the state and is now tackling the "top 300."

TERMINALS REVIEW

A guide for buyers, salesmen and others who need to know the characteristics and prices of ALL keyboard remote computer terminals marketed in the United States.

Non-Printing (mostly CRT) alphanumeric and graphic terminals, each classified by type and priced in all its character capacities and column/line formats, plus physical characteristics and options.

Printing terminals, each classified by type and priced, plus printing speeds, physical characteristics and options.

Rental Prices for popular KSR and ASR model teletypewriters from nationwide leasing companies.

Directory of Manufacturers.

All data is presented in a computer-generated, highly compact tabular form for easy eyeball comparison of terminal characteristics and latest prices.

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Microfilm plotters. Here, we got bigger by getting smaller. With microfilm. Our 1675 COM plotter/printer and our 2100 COM printer deliver the best price/performance in the industry.

Disk memory equipment. This was our second area of concentration. In a remarkably short time, we have become the leading independent supplier.

Tape systems. We've recently begun to concentrate

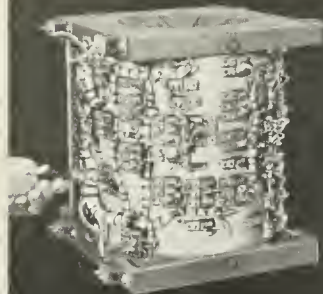
on tape. The result is that our new 1040 Tape Drive combines the features of others with our own experience. We intend to be a leader in this field.

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Australia's economy reportedly is booming and wages have reached near-U.S. levels, but overall employment is causing grave concern to Australian employers. This is especially true of the computer industry where there are presently three openings for every available applicant.

The "Australian Financial Review," Australia's leading business newspaper, has been running stories since June concerning that country's worst-ever DP staff crisis.

Because of this demand, Australian companies have been

looking increasingly overseas, mostly in Europe, to find qualified staff. One company, American-Australian Executive Placement Pty. Ltd. (AAEP), has been seeking U.S. computer personnel to live and work in Australia.

AAEP Chairman Gordon Hooper said Facom Australia Ltd. (Fujitsu Ltd.'s Australian company) and IBM Australia have made offers to people in the U.S. and Venezuela. Other mainframers such as Olivetti, Honeywell, Univac, NCR and DEC all stated interest in anyone with appropriate qualifications who decides to make the move.

Just what are the prospects for an American "Down Under"? Over the past 10 years, according to Australian Government statistics, 70% of Americans who made this move were satisfied with the way of life and job they found in that country.

For the 30% who could not, or would not, accept day-to-day conditions and who returned to America, the direct and indirect expenses exceeded \$10,000 per family of three.

Hooper feels Australia will prove a rewarding way of life for most who choose this move, especially people with sound technical ability, but he cautions Americans to be very sure of specific job prospects and living costs prior to departing the U.S.

Incomes in the Australian computer industry generally fall within the following ranges (\$U.S.), according to the latest salary review compiled by a Sydney management consulting firm: programmer/analyst, \$11,481-\$15,225; systems analyst, \$14,478-\$22,275; systems manager, \$16,338-\$22,275; and EDP manager, \$20,790-\$29,700.

'Room to Breathe'

Interviews with two Americans living in Australia revealed some interesting insights into the reasons Americans choose to live in that country.

Dean Mohlstrom moved from Kansas to Sydney three years ago and is now computer products manager for Ampex Australia.

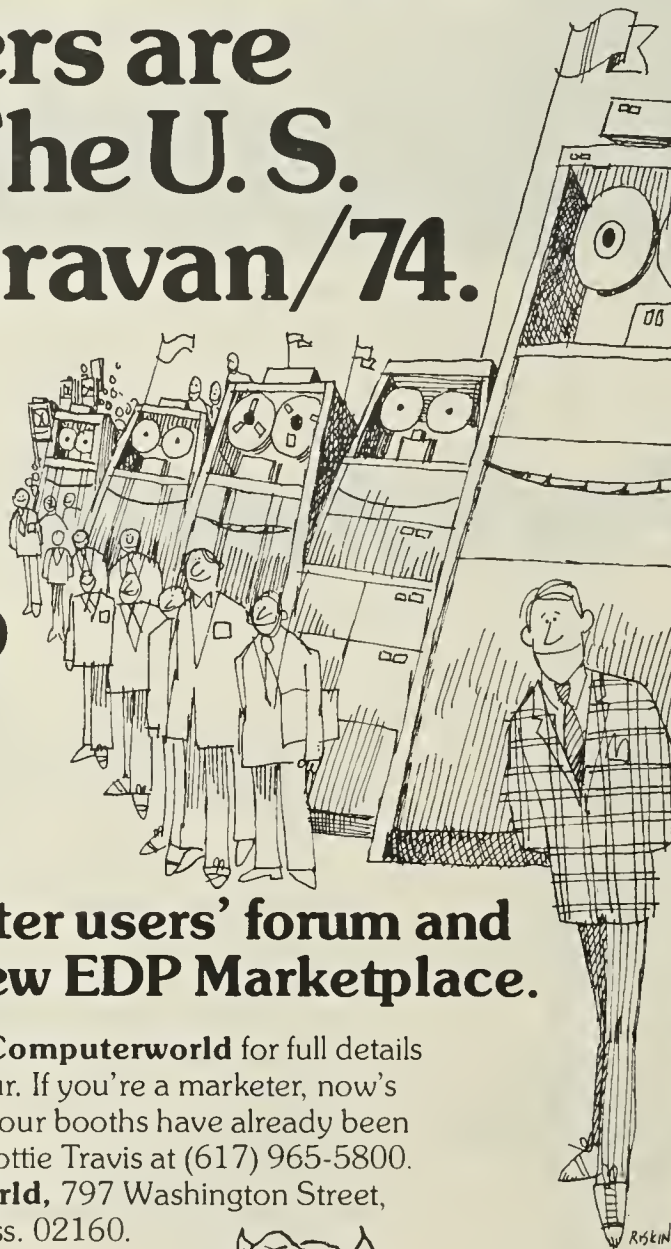
"I was lucky enough to be sent over as a representative for an American company to set up Australian operations. After the program was up and running, I decided to stay in Australia rather than rejoin the rat race back in the States. I love this country and the fantastic opportunities it offers both in business and life style," he said.

Donald Diggins of San Clemente, Calif., arrived in Australia in September 1972 and is now sales promotion consultant with Honeywell's Information Systems Division. His managing director (president) at Honeywell is also an American.

Diggins feels "Australia has the advantages of California 30 years ago. It is clean and people have room to breathe."

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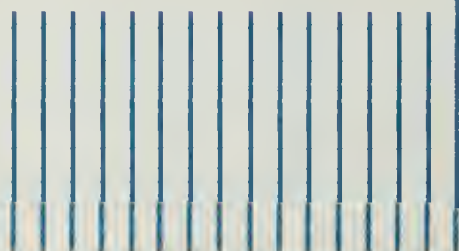
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Editorial

It's About Us

Chances are, we can't go on meeting this way.

Not to make light of a serious situation, we'd just like to say the paper shortage — coupled with a strike at *Computerworld's* supplier's paper mill in Canada — is having noticeable effects on our operation.

We've had to enforce earlier deadlines because this temporary "newsprint" (actually, it's bible paper) cannot be handled as effectively on the printing presses. Longer press runs mean earlier deadlines and possibly late delivery.

In general, comment on this new paper has been about 60/40 in favor of the quality. While we'd prefer something like 90/10, there is little we can do about it.

Short of restricting the maximum pages in any given issue, we are investigating what appears to be the only alternative: glossy paper.

If the paper strike is over in less than six weeks, we may not have to make this physical change. Otherwise, we simply won't go on meeting this way.

Societies Must Carry Out HEW's Privacy Ideas

By Willis H. Ware

Special to *Computerworld*

I sympathize with the view expressed by David Blow in his letter of Sept. 12. The professional societies in fact did not rise to the issue of computer privacy and barely rose to the issue of computer security. Perhaps the following comments will make Blow feel somewhat better.

The computer profession was very well represented on the HEW committee. Three of us are contemporary and active practitioners in computer science and technology. In addition, there were eight others who are deeply involved in the use of computers or in the operation of large data systems that include personal information.

Among these was one individual closely associated with the criminal information system of New York State and a second who had been involved in the design and implementation of an early credit reference data bank. Thus, the recommendations of the committee do reflect the considered judgment and insights of experienced computer professionals.

I suspect it is just as well that professional societies were "beaten to the punch" to use the phrase introduced by Blow. The solution to the problem of protecting personal privacy will almost certainly involve new legislation of some kind.

Writing and sponsoring legislation is never an easy task and I wonder what success professional societies might have had in achieving such a goal if they had faced the problem and dealt with it.

Functioning as we did at the level of a major federal agency

and having the endorsement of two Cabinet level officials, committee recommendations were launched with a high probability for successful acceptance.

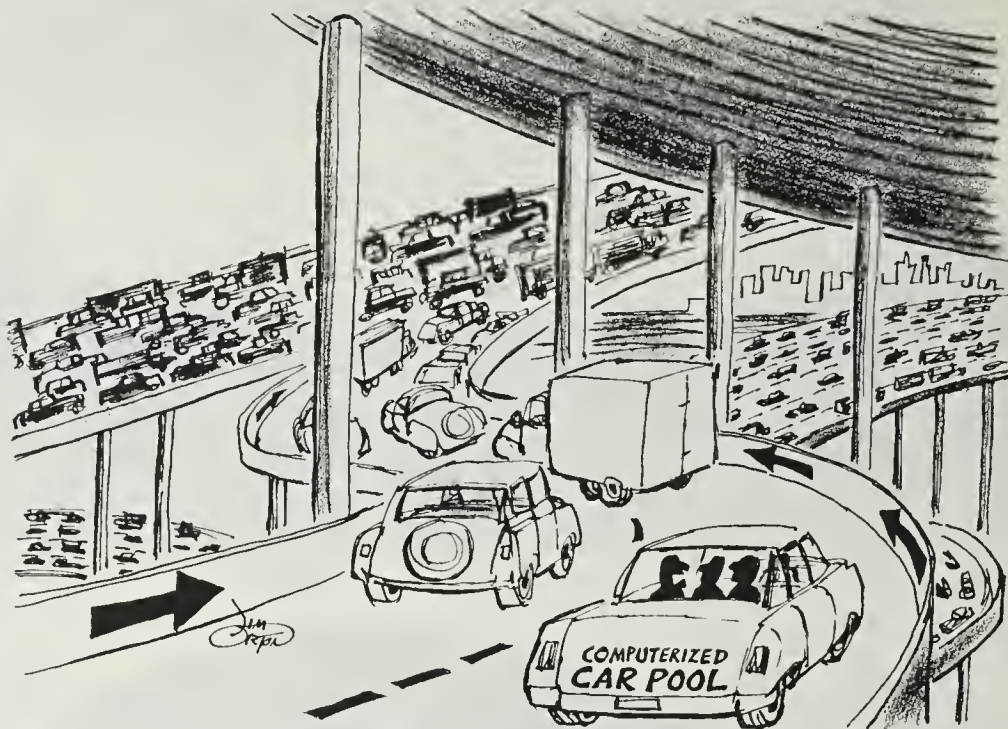
I am convinced the problem was worked in the right place. It is fortunate for the American people that (former) Attorney General Richardson was sufficiently concerned to create this group, and it is equally fortunate that Secretary Caspar Weinberger saw fit to follow through with the group and to endorse its findings.

The importance of the issue and the significant contribution that this committee has made to its solution has been widely publicized through press, magazine, radio and TV coverage. Several thousand copies of this report have been mailed to federal agency heads, all members of Congress, several hundred state legislators, all governors and a variety of others. Such exposure would have indeed been difficult to achieve for an initiative action from a professional society.

I am also convinced, however, that the professional society now has a major role in following through on the committee's work. The issue of personal privacy and of universal identifiers is subtle, technically involved, and has significant social consequences.

The many societies that serve the computer profession and publications such as *Computerworld* have, in my view, a major responsibility to carry forward the development of the issue, the ideas and the solutions outlined in the HEW report.

Willis H. Ware was chairman, HEW Secretary's Advisory Committee on Automated Personal Data Systems.



'Let Me Out! The Computer Never Said You Were All Democrats!'

Letters to the Editor

... 'Immoral Action'

Sept. 18, 1973

Mr. Roger Wheeler
Chairman
Telex Corp.
Tulsa, Okla.

To the Man Who Represents the Head of Telex Corp., Roger Wheeler, and All Who Are Responsible for the Corporation's Business:

Congratulations on being involved in one of the most *immoral* actions I've ever witnessed.

I was appalled and horrified when I read of your "victory" over IBM in the *New York Times* today. Free competition in America is what made it great — with the beautiful justice being that the strong and ingenious get great rewards and the weak and unoriginal get their due, too — which can only be as big or as small as their effort and success.

You, Mr. Wheeler and others, are a horrendous example of the *destruction* of that justice — now that you, as the weak and worthless corporation — are *by force* (legalized force — which is just as immoral) taking the rewards that another bigger and better corporation has *earned*.

IBM became what it is because of the brains that produced it. Now you are the infection who's trying to live off those very same "brains."

Your victory cannot sustain you forever, though. If you hadn't the skill to keep a corporation going in the past, the stolen goods you've legally heisted from IBM will not help you in the long run. *No one* can steal the fruits of another man and expect to be that victim's equal.

Congratulations, Mr. Wheeler and all who are responsible, for pulling off the most despicable robbery I've ever witnessed.

Cheryl Johnson
New York, N.Y.

Telex replied to Ms. Johnson's letter, indicating her attack was more personal than technical, and claimed her letter did not address legal or moral issues. The reply was sent by J.B.

Bailey, vice-president and general counsel of Telex, who requested that his letter, which he considered personal correspondence, not be printed. Ed.

'More Outrageous'

Oct. 1, 1973

Mr. J. B. Bailey
Vice President and
General Counsel
The Telex Corporation
P.O. Box 1526
Tulsa, Oklahoma 74101

I took your advice and read *Computerworld* and find the whole situation more outrageous than ever!

The people for and against the decision are making the common error of totally missing the point! The question here should not be whether the judge was biased, or whether the decision will "work" long range or short range, but whether the government has the moral right to dispose of someone's property! It is slightly terrifying that the courts could get a ruling such as this.

Everyone is questioning insignificant side issues, but most are not questioning whether the antitrust law is right or wrong!

I do not doubt that Telex had a good "case" given that law — but that is not the issue. If the

government passed a law tomorrow that all individuals are legally justified in stealing the property of their neighbors, does that law change the *immorality* of it? Absolutely not.

Your company is making claim to the property (money and ideas) of IBM, and no distortion of the facts can change that. If a bum on the street came up to you and told you in a self-righteous voice that *you owe him* your money because he doesn't have a chance to compete with you, you, I'm sure, would be appalled and disgusted — yet you are doing the same thing *in principle* to IBM with the mask of *legality* hiding the guilt you deserve to feel!

In answer to your second paragraph, *forced free competition* is a blatant contradiction too obvious to be overlooked.

I'm very sorry to see that there is no one, or very few, who have had the sight or courage, to cry out in angry protest of the horrible injustice of this suit.

I obviously do not feel my "attacks" upon your company and its management are unwarranted. The contempt I feel for all involved is stronger than ever.

Cheryl L. Johnson
New York, N.Y.



Achievable but Demanding Objectives

Manage Your Own Career by First Setting Goals

Return on invested capital is the acid test of business management. The acid test of your management of your own career is whether you are pouring your life into work that is meaningful to you, that satisfies you. This may or may not include prestige or financial reward.

If you do not accept responsibility for managing your own career, and let others decide for you, you will devote your working life to such imposed goals, which may

Management

By Frank Greenwood, PhD



be irrelevant to your objectives. You may then feel powerless and resentful.

It is better to recognize there is conflict of interest between you and any organization. For example, you want more pay, they want to control EDP costs; you want time with your family, they want the accounts receivable system redesigned fast; or you want to experiment with the software, and they need to maintain the production programs.

Such conflicts may be resolved in favor of the organization if you have abdicated your responsibility for your own career.

Begin With Goals

You have to manage your own career, and this begins with your

goals. Set goals that are both achievable and demanding enough to be worth your working life. Set near-term objectives that get you the experience, training and contacts you need for your long-run goals. If you want to be responsible for the entire EDP function, for example, you have to consider how to acquire the necessary background and management experience.

No matter what your goals, think of yourself as a salesman. Act like a winner (even when it hurts); never show low self-esteem. Confidence is the most essential element for success. If you want to be responsible for the EDP area, you have to convince those who decide that they should give you the chance.

People are everything. Even the assassin needs his victim! People design the circuitry, people update the software, people prepare the input and people make decisions with the output information. Take people off the earth and you would not need computers.

Figure out who the people are who decide who will be given responsibility for running the EDP function. Determine how they make these decisions. Always stay in personal touch with them. Of course, you want to support your boss and make him look good.

It is also important to support your subordinates. We all have our illusions, so don't challenge another's self-image.

Develop visibility by publishing, attending industry functions and by participating in professional associations. It will help you market yourself and increase your job choices. Without alternative employment opportunities, your bargaining position is toothless. But, as Mike Parr, president of Source EDP, says: "It is extremely unwise to use a job offer with a new company as a wedge within your present organization. All you are doing is postponing the day when you will again realize there is a fundamental difference between your outlook and your company's."

"In addition, you are at a definite psychological disadvantage in terms of future promotion, since the very fact that you have sought new employment indicates a disloyalty to your present organization."

Making Decisions

Over the long pull, few factors make more difference than how you make your decisions—especially your career decisions. Deciding objectively, with carefully gathered facts, makes for

better decisions, increases your flexibility and improves personal relationships (since you ask "what's right?" and not "who's right?").

It may be unsound, for example, to change jobs for more money without gaining on your long-term goals. Being labeled a job-hopping opportunist could hurt your long-range earnings. A better decision would be to change jobs for more responsibility or for broader technical exposure.

Your health is basic. Everything rests on it. Without your health, you have nothing, as Maurice Chevalier recognized when he commented that being 70 was acceptable, considering the alternative. Diet and exercise are important. Regular workouts are recommended.

A couple of don'ts are:

- Don't forget the importance of non-career matters. Without the meaningful human relationships of family and friends, life would indeed be empty.

- Don't begin to think you are indispensable. The cemeteries are full of indispensable people, yet somehow the world's affairs grind on.

Manage your own career so you do work that is important to you and satisfies you. Otherwise, the decisions will be made for you and often against your best interests. Set your own goals and develop your own strategies for attaining them.

It helps you little to read a lot about management if you don't figure out how to ease into a management slot. Once promoted, all your studying is wasted if your strategy for survival as a manager fails. Therefore, your career goals and strategies deserve your best thought.

(Frank Greenwood is computer center director at the University of Montana.)

Letters to the Editor

I/O Revisited --or What's a Mini For

Kenneth Patrick's letter [CW, Oct. 10] presents concepts about the mini and data processing in general that we find just aren't true. Probably the most obvious are his estimates of output print lines to input records and the print line production of a mini's printer.

Patrick's claim of less than one line of printer output for each input record is considerably less than our data shows for a number of installations processing typical business applications. We have found this ratio to vary between a low of 2.6 and a high of 11.5 lines of output for each input. After all, most systems require a one for one merely for audit and control.

His estimate of over a half million lines of print in 40 hours on a 250 line/min printer might be

possible on a large multiprocessing system but certainly not on any mini.

This estimate is simply a calculation of rate times time and computer systems just don't run that way. Our analysis of systems operating on a 360/30 shows a range of four to 11 minutes of processing for each 1,000 lines of I/O.

Therefore, the actual average rate of a 1,000 char./min reader and 1,000 line/min printer varies from 90 to 250 I/Os per minute. Some limited information on an S/3 installation shows 30 minutes of processing for each 1,000 I/O records.

We would certainly appreciate any data along these lines you or your readers may have available.

Ben Blumberg Jr.

President

Programs & Analysis, Inc.
Burlington, Mass.

Reader Enters Benchmark Contest

Permit me to enter the "Kibitz John Hills Benchmark" Contest, based on my Sept. 12 quote in *Computerworld*. The "job" does have significance, especially in somewhat longer production periods than used.

In this case, 370/145 OS-VSI ran 23+ jobs in 80 minutes, or 17.2+ job/hr. OS-MFT handled 23 jobs in 129 minutes, or 10.7 job/hr. Thus, OS-VSI gives 17.2+ job/hr., takes 82.2% CPU active, while OS-MFT gives 10.7 job/hr., takes 37.6% CPU active.

While OS-MFT isn't linear, we can ratio 17.2 jobs to require no more than 60% of the CPU while operating under OS-MFT.

Maybe Hills' art form isn't too sharp; but I feel his logic is pretty good.

Donald C. Harder
Cleveland, Ohio

From Alan Taylor's Mailbag

Charge Unsupported Input?

Dear Alan,

Here is an exchange of letters which may interest you.

T.E. O'Connor July 31, 1973

'Impossible to Produce'

Dear Member,

A copy of the service station charge record that you recently requested is enclosed. With this information I am sure you can verify your purchase.

For future verification on your service station purchases made with our card, please be sure to keep the charge slip given to you by the station attendant. American Express does not enclose copies of such charges with its statements, because oil companies usually do

The Taylor Report
By
Alan Taylor, CDP



not send us the extra copy that would be needed for this purpose. And in the very near future all service station charges incurred on American Express Cards will be received here on electronic tape, making it impossible for us to produce copies. (ATMB3)

We are pleased that we can accommodate you in this instance, and we hope you will always find the American Express Card useful for your motoring needs. (ATMB4)

K. Coleman

Customer Service Representative
American Express Co.
P.S. \$7.78 and \$54.60 payments will be credited on your next statement.

No Supporting Proof

Aug. 2, 1973

American Express Co.,

Thank you for your form letter response to my request for proof of a \$4.25 unsubstantiated charge on a recent billing.

However, I am concerned over your statement that oil companies do not normally provide

such voucher proof of charges. I am even more concerned over your admonition that future inputs from oil companies will be on mag tape, with no supporting proof of items submitted for payment! (ATMB3)

As one long engaged in the systems and data processing professions, I am aghast that the financial community would place such faith in the quite fallible computerized system; if one considers that while the hardware itself is rather fail-safe, the people who program, operate and feed the computer software most certainly are not fail-safe. To the contrary, they are frequently careless, stupid and sometimes vicious!

I, for one, will avoid using the AMX card for oil company purchases. If I must so use it, I will continue to insist that I be provided voucher proof before payment. (ATMB5)

I believe there are ample precedents for this position.

Believe me when I say the world is not quite ready for a money-less, bit-computer-clear-
(Continued on Page 12)

ATMB Professional Points and Opinions Questionnaire

A number of points brought out in the letters printed in the mailbag are worth general discussion at this time. What are your opinions on the points that interest you? You can use the questionnaire, or write a separate letter to Alan Taylor Mailbag, 633 Central St., Framingham, Mass. 01701.

ATMB/3 — Should a gas station charge system be able to produce charge copies? _____

ATMB/4 — If a system cannot produce charge copies, can it be correctly represented as being "always . . . useful for your motoring needs"? _____

ATMB/5 — Is a system client entitled to insist on proof of charges in a charge system? _____

ATMB/6 — What is ACM and ACM's representative's role in Cobol standardization? _____

ATMB/7 — Is announcement of Cobol review in Ansi publication enough to obtain review of proposed Cobol standard? _____

Name _____

Position _____

Address _____

Society memberships _____

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Letters to the Editor

Upgrading a Problem?

In response to the Sept. 26 article, "Greatest Danger to Small Users May be Upgrades," it seems that Burroughs is always included in the etc. group of System/3s, NCR 50s, etc.

If you had taken the time to research, you would have found that upgrading is not a problem with the B1700 Series architecture that Burroughs small users are currently using. Their programs will execute on any B1700 series computer without recompilation and this will continue to be true as the B1700 grows along with its user base.

If IBM ever drops support of RPG or forces its System/3 users to a new system, they can always run them on a B1700 (with

increased efficiency).

Dennis DeGraff

Phoenix, Ariz.

A Look at 7/32...

Your analysis of the Interdata Model 7/32 [CW, Oct. 10] contains several disconcerting statements, apparently caused by some confusion regarding the relationship between user-level architecture and hardware-level architecture. The article states that "the new machine is designed to handle (the existing 16-bit) software. Architecturally, this means the memory bus is only 16-bits wide..."

In fact, there is no reason why a machine with a 32-bit wide data path could not perform halfword-compatible operations. It would, however, have to be

able to provide condition code settings based on the status of the low-order halfword of the general register being tested.

This requirement is reflected in the 7/32 by the unique dual-condition code architecture; this is a user-level architectural feature, which places no constraints on the data path width of the hardware-level architecture.

In fact, this user-level architecture could be implemented on a 16-bit, 32-bit, or, for that matter, a 1-bit machine, if desired. The trade-off is simply cost versus speed. (It should be remembered that the IBM 360/20 was an 8-bit machine.)

Barry I. Kelman

Systems Programmer

Interdata

Oceanport, N.J.

Tired of waiting for reports?



Even this patient fellow appears to be getting a little put out with the slow turnaround often associated with a need for reports. If he'd had **EASYTRIEVE**, the results requested from the computer would have been on his desk within an hour!

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Charge Unsupported Input?

(Continued from Page 11)
inghouse-in-the-sky way of exchange.

Thomas E. O'Connor,
San Jose, Calif.

Three Questions

Professionally interesting questions related to these letters are:

- Is a gas station charge system which cannot produce copies of the original charge, but which relies upon tape records received, an acceptable use for data processing services? (ATMB 3)

- Is a credit card system properly pushed as being "always... useful for your motoring needs" correctly so recommended when proof of motoring charges may not be possible? (ATMB 4)

- Is the person dealing with a credit card system, who has signed a contract which probably provides for his acceptance of any regulation that the credit card company cares to put forward, entitled to require voucher proof before payment? (ATMB 5)

ACM, Cobol Standards

Dear Mr. Taylor,

The Sept. 19 issue of *Computerworld* indicates that Ansi reopened a comment period for the draft Cobol standard on Aug. 15 which will end Oct. 16.

It is disappointing that the ACM representative to X3 was apparently unaware of the reopened comment period during the ACM conference, Aug. 27-29. (ATMB 6)

I recommend that in the future Ansi provide earlier information to the public when a comment

period is reopened. It would be helpful if Ansi could provide page revisions and an announcement of reopened comment periods directly to those people who have responded directly.

If the *Computerworld* announcement was the first information available to the public, the comment period should be extended until Nov. 16 in order to provide suitable time for comment preparation and input. (ATMB 7)

Samuel T. Baker
Systems Analyst

Two Questions

The professionally interesting questions related to this letter are:

- What is the role of ACM, and of ACM's representative on X3? What should happen when ACM members do not receive adequate, timely information from their representative? (ATMB 6)

- Is the Aug. 16 announcement which did appear in the Ansi publication *Standards Action*, but which neither reader Baker, nor apparently ACM's representative knew about, adequate publication, or should publication also be necessary in more easily accessible, generally read papers, such as *Computerworld*, before the comment time period should start to run out? (ATMB 7)

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Protect = Protects

Clear text (top) was converted into two different results with the change of a single character in the key used to control the transformation, using a \$15,000 cryptographic package from Computerized Industrial Security Co., Box 121, Woodstown, N.J. 08098.

The system is written in Fortran and has been implemented on a variety of CPUs, including IBM 1130s and 360s, DEC PDP-11s, Honeywell Series 200s and Burroughs B3500s. Each package is slightly different for added protection, the company noted.

Edos RJE Option Will Integrate Terminal Support Under Spooling

RICHMOND, Va. — The Computer Software Co. (TCSC) has introduced a remote job entry (RJE) capability to the Extended Disk Operating System which, a spokesman said, will "completely alter the economics of RJE." It supports high-speed terminals now and in the first quarter of 1974 will apply to low-speed equipment as well.

The extra-cost RJE option has been integrated into the EDOS Extended Spooling Facility (ESF). Since spooling is not functionally a subsystem of EDOS, all the capabilities of the operating system are available under RJE. The system will, for example, make Automatic Volume Recognition (AVR) and JCL procedure library support accessible to the remote user.

This means, with the latter feature, that the terminal user need not key in all his JCL, a process that effectively ruled out the use of keyboard-only devices for RJE. AVR overcomes the communications gap that has existed between remote user and mainframe operator in other DOS-based RJE facilities.

AVR searches the active tape and disk units for selected data sets as a job reaches the top of the input queue. If the data sets are found, they are used; if not, a MOUNT message is issued to the operator, and the job is handled as soon as the files are ready.

Previously, the EDOS vendor explained, RJE jobs were just "flushed" if data sets were not in place when the job was ready. This meant the operator had to anticipate

jobs, or they were not executed when the user expected.

Output under the new RJE option can be directed by the user to his own terminal, to the mainframe line printer, or to some other terminal. In addition, the user may interrogate the output file to determine if a defined condition has been met, before allowing any printing.

An "intelligent output control" module is geared to the use of preprinted forms at remote printers. The module allows the user to tag generated files with special form names. When a form is mounted, the user keys in its name, and the module searches for any files that are to be printed on that particular form.

There is a security-oriented scrambler module, seen as especially useful to service organizations, that scrambles user IDs before displaying them "anywhere." It doesn't scramble data, but if unauthorized users can't get to the files, it doesn't make any difference whether the data is in clear text.

The RJE option is available now for 1052 and 2780-type high-speed terminals, including several of the smaller 360s.

The RJE option costs \$125/mo plus \$75/mo for each type of terminal to be supported. To implement the new feature, users also need the basic EDOS (\$260/mo) and the ESF feature (\$240/mo). Annual lease and purchase-option plans are available.

The Computer Software Co., a subsidiary of The Computer Co., is in the Seventh and Franklin Bldg., 23219.

OS/7 Memory System Gives Virtual-Like Use

By Don Leavitt
Of the CW Staff

BLUE BELL, Pa. — The OS/7 operating system for the Univac 90/60 CPU [CW, Oct. 24] is similar to IBM's DOS/360, but it has features that even more closely resemble IBM's OS/MVT option or the support provided by Burroughs' Master Control Program (MCP).

Though some of the system's features seem close to those of a virtual memory system, Univac spokesmen stressed that OS/7 is not the long-rumored implementation of VMOS, from Series 70, on the high end of the Univac 9000 (now Series 90) line of mainframes.

OS/7 is a multi-tasking, multi-programming system that utilizes a roll-in, roll-out capability to keep the CPU optimally busy. This is the same kind of capability OS/MVT uses, Univac said, but OS/7 goes one step further by allowing the task to be brought back into any available place in memory.

The system's architecture does not include either fixed or variable partitions. Memory as a whole is considered one of the system resources.

The Univac operating system functions like Burroughs' MCP in that it supports dynamic allocation of memory and users can keep on loading jobs, up to a limit of 14, as long as there is memory available. MCP reallocates work every time a program is completed, but OS/7 makes the moves only if there are other jobs waiting for memory, a Univac spokesman explained.

The ability to run jobs as a series of tasks allows the OS/7 to design, in effect, an operation closely akin to virtual memory in that only the active subset of the whole program need be in memory at any given time, but the rest of it is quickly accessible, without the overhead of dynamic address translation.

System functions also include job scheduling, based on dynamic reaction to priorities assigned by the user; job initiation; and job accounting, after the work has been completed. Scheduling can be based on either a first in-first initiated, or a first in-first fit approach, the company noted.

The system also includes communications support through the new Integrated Communications Access Method (Icam) and remote job entry facilities; a range of utilities and language processors; and support for data base management through a system (DMS/90) said to closely match the Codasyl recommendations for such operations.

A transaction-oriented information management system (IMS/90) is also available to Series 90 users, Univac added, as are a growing number of application packages.

The amount of memory required by the operating system and its various capabilities depends on just which parts of the system the individual user requires. As with almost all Univac software, the new offerings are available without cost to users with the appropriate configurations.

'Splice' Speeds Cobol Coding

HUNTINGTON, N.Y. — DOS and OS/360-370 users have another Cobol pre-compiler to consider, with the Shorthand Programming Language in Cobol Environment (Splice) package from Crawford and Grauer Associates.

The package appears to be very fast and more economical than several other pre-compilers both in core requirements and cost. It uses 26K under DOS and is available for \$100/mo or a one-time fee of \$5,000.

Splice produces ANS Cobol source code from abbreviated statements which can be written on standard Cobol coding sheets. It handles much of the drudge work needed to get a program started, the vendor said, and lets the programmer concentrate his effort on the actual application logic.

Parts of the generated source code — the date written and installation name in the environment division, for example — are based on internalized entries. Other parts, such as the fields within each record, are calculated from Relative Addressing refer-

ences within the programmer's Procedure Division coding.

Generating data names is faster for the programmer than coding them, one Splice user agreed, but added that the results tended to be short and not very descriptive. This works well enough for the great volume of quick-and-dirty jobs, he said, but leaves something to be desired on long programs where the self-documenting nature of Cobol is at least partially lost with meaningless data names.

Support for shortened forms of Cobol reserved words (M for Multiply) is part of the Splice package and is "nice but not vital," he added.

Splice can reduce a programmer's work by 50% to 75%, Crawford and Grauer claimed. A sample program the company provided showed 39 Splice statements generating 182 Cobol statements, in 38 seconds of elapsed time on a 360/40 under DOS.

Written in BAL for efficiency, the package can be ordered from 10 Surryhill Place, 11743.



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The General (Tire) Approach

Optimizing 'Output' Upgrades Entire DP Operation

AKRON, Ohio — "Output" appears at many points within a DP operation and many installations have found various ways to optimize these visible results.

At General Tire & Rubber, software support is the primary method used to bolster output at the various levels. Packages now in use include a project control system to monitor the program development staff, a librarian to guard and manipulate source programs, a generalized report generator for end users who needed access to a data base, and specialized support for financial reporting by a foreign affiliate.

The conglomerate's data center here supports the DP operations from corporate headquarters and the highly centralized tire division. The mainframe is a 1M-byte 370/155 and the center also includes "a whole batch of 3330s, two or three printers, and a string of tape stations," according to John Remias of the

Management Information Systems staff.

The center has begun to use the project planning and control package from Auxco, New York, N.Y., to keep the development staff and management aware of progress or problems. This package "looks pretty good," Remias said, primarily because it has "fleshed out" a set

User Casebook

of standards the company had developed over time.

Once developed, the source code for the application programs is stored on disk and put under the Plus-DA software security and control system recently acquired from Cullinane Corp., Boston, Mass. This package, like most "librarians," eases maintenance chores for the

programming staff and thereby improves its "output."

With the Total data base management system from Cincom Systems, Cincinnati, Ohio, already in place, the technical support group developed its own interface with the Culprit "output processor" (another Cullinane package) to simplify the generation of reports on either a one-time or production basis.

The interface worked so well, Remias noted, that it is now being marketed by Cullinane to other users of Total and Culprit.

Foreign Affairs

General Tire's international division includes a number of relatively small DP centers in South America, Europe and the Mideast. To bring the reports from these autonomous affiliates into some sort of useful common format, the international treasury group developed and then im-

posed a "really fine chart of accounts."

Working with that chart and the relatively inexperienced staff at General Tire's Tehran, Iran, 360/25-based DP operation, technicians from Software International customized its general ledger package to fit the special needs of that remote location.

The Software International package is designed to be modified, so that part of the installation was not in itself unexpected, Remias said, but he seemed genuinely surprised by the amount of customization that General Tire had to do to complete the fine tuning of the system.

On the other hand, he gave full credit to the vendor for implementing the ability to generate the financial reports in terms of either the U.S. dollars that Akron headquarters wanted, or the local currency required for Iranian use.

Since the local currency is the rial, this flexibility led one wag to paraphrase the IBM slogan, so that it reads, "Not Just Data, Riality."

On a more serious vein, Remias said Software International provided good support for the local environment by training the Iranian staff to work with a sophisticated file structure, and left them with a system that has the ability to recover quickly from power failure without loss of data.

The system installed in Tehran is written in ANS Cobol and probably could be adapted to other international operations, Remias thought, but at the present time, the Iranian installation is the only one large enough to handle the software, even though it only requires 24K of memory.

The 'Spice' of Life?

NORWALK, Conn. — Electrical engineers can use the Interactive/Simulated Program Integrated Circuit Emphasis (I/Spice) software, now on the National CSS computer network, to describe proposed circuits and receive results of simulations and analyses on a terminal. This allows users to probe the state of elements of the circuit during simulation, as if a "breadboard" and oscilloscope were in use.

Indeed, if a CRT terminal is used, a network source claimed, the output is directly comparable to what the engineers would see on an oscilloscope.

Sherry Says...



The Data Communication Forum

Since ecology is such a popular subject today, I thought up a great slogan for ICC's advertising . . . "Stamp Out Error Pollution — Use ICC Modems!" Good slogan, right? Well, my suggestion really backfired. The ICC people now check out every one of my presentations at the trade shows to see if I make any errors in my script.

Of course, this ecology cause can be carried too far. Our Customer Support Group recently got a call from a communications manager who was really desperate. His computer wouldn't accept data from his terminals, and constantly requested retransmission. We finally found his problem. His programmer was so dedicated to ecology, he had programmed the computer to recycle all data!

New Product Note: ICC isn't a company to split hairs unnecessarily, but they don't hesitate to split telephone lines. Telinc 100 is a new product that lets two independent phone conversations go over the same line at the same time. There's even room on the line for teletype. If you have any questions about how this works . . . don't ask me! Call your ICC sales rep.

If you have questions or topics you would like to see in our column, send them to: "Sherry Says" c/o: International Communications Corporation 7620 N.W. 36th Avenue Miami Florida 33147
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Or if you need bulk storage, you can get an optional IBM-compatible magnetic tape drive.

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Data Briefs

Monitor Uses LED Display To Check EIA 232 Interface

OGDENSBURG, N.Y. — I.P. Sharp Associates has introduced its Monitor 232 to test interconnections between modems and terminals conforming to the EIA 232 interface.

The 6 in. by 2.5 in. by 1 in. battery-powered unit provides direct access to 14 interconnecting leads. Users can disconnect these leads and cross connect any terminal by cord patching.

Seven leads are permanently monitored by LED displays while an eighth LED is floating for patching to individual conductors. Patch cords are supplied to perform non-standard interconnects and signal simulation.

The Monitor 232 costs \$135 with initial delivery taking eight to 10 weeks from the firm at Bridge Administration Building, Bridge Plaza, 13669.

Program Schedules Multi-Terminals

PALO ALTO, Calif. — Hewlett-Packard is offering a control program to provide multi-terminal, multi-tasking scheduling for HP 2100 users.

The Terminal Control System (TCS) eases the application programmer's job in scheduling I/O for a variety of multi-terminal data base applications, an HP spokesman said.

TCS is available for \$2,000 to users in the field, with delivery off-the-shelf from the firm at 1501 Page Mill Road, 94304.

Terminal Protects Data

ANAHEIM, Calif. — Lear Siegler has introduced a display terminal for applications using repeating formats.

The ADM-1 allows a form to be typed onto the display face and held in protected mode. Entries can be made and transmitted without disturbing that protected data.

The ADM-1 costs \$1,600 with delivery in 90 days from the firm's Electronic Instrumentation Division at 714 N. Brookhurst St., 92803.

Data Station Upgraded

CULVER CITY, Calif. — Computer Communications, Inc. has introduced an interactive display terminal as an upgrade to the firm's CC-30 communications station.

The CC-40 offers a switchable 40 or 80 character display line format and a 1,920 character buffer capacity which can be displayed in 24 lines with 80 characters each, or in two separate "pages" of 24 lines of 40 characters.

The CC-40 will cost \$3,850 with deliveries beginning in the first quarter of next year from the firm at 5933 W. Slauson Ave., 90230.

Plug-Compatible, With CRT

Model 28 Replacement Checks Errors

By Patrick Ward
Of the CW Staff

NEW YORK — When British Airways (BOAC) changed over to real-time reservations and passenger list control in 1968, it was left with an extensive private telegraph network with Model 28 ASRs, still needed for administrative functions, but with a lot less other work to handle.

"In most instances, the amount of traffic we were left with did not justify the use of teletype operators as specialists, so the burden of preparing messages and sending them into the computer was left with people who were trained for other types of jobs," said Victor Gomez, manager for telecommunications operations, North America.

"That was one of the reasons that encouraged us to look for some sort of device that would automatically originate the format, and if the format was not there, would somehow prevent the operator from making errors," Gomez remarked.

What was needed, Gomez decided, was an intelligent terminal, and what was chosen was Megadata's Macnet message switching terminal.

"We couldn't find any other manufacturer in the U.S. that would offer us 83B3 discipline with CRT operation and the five-level code at 75 bit/sec, 100 word/min."

Most of the terminals he tested, Gomez said, "were really designed for real-time operations and not truly as a telegraph

replacement."

In looking for a terminal, BOAC considered Wiltek, Hazeltine, Incoterm and Univac terminals, as well as equipment from Ferranti of England.

"The other thing we found was that none of the other intelligent terminals provided for sufficient storage. We needed sufficient storage to accumulate up to 30 messages of 50 words length," with minimum storage of at least 2,000 characters. BOAC's average message is about 300 characters, Gomez noted.

BOAC's aim was a terminal that could easily be converted to any of the more popular line disciplines; that could automatically originate a format; whose keyboard would allow for touch typing; and a terminal which could be adapted and not replaced if BOAC wanted to change its line disciplines or if it wanted to go faster

in pulse rate.

"We achieved all of that with Megadata, actually," Gomez remarked. He has been using the Macnet for about a month.

This Megadata has a hardcopy printer, CRT monitor and a convenience that Gomez appreciates, a tray between monitor and keyboard to hold the copy the operator is keying from.

The CRT provides normal editing found in an intelligent terminal, Gomez added, including cursor movement, deletion and insertion.

BOAC is now using four of the terminals for telegraph message input, but is planning to expand to about 80 in early 1974.

BOAC's four terminals cost an average of \$4,950 each, according to a Megadata spokesman.

Communications 'Institute' Tailored to Teleprocessing

By Ronald A. Frank
Of the CW Staff

SAN DIEGO, Calif. — Users looking for an educational boost in their knowledge of data communications often find courses that don't totally meet their needs. Some of these seminars are too basic, too advanced, or deal with topics such as voice communications that are

not of primary concern to the teleprocessing user.

The ICC Institute is tailored specifically for the teleprocessing user. The Institute is sponsored by International Communications Corp., the modem vendor. Yet despite its name and sponsorship the

Analysis

two-day course is conspicuous by its total lack of a sales pitch for the company's modem. The closest things to identification with ICC are the system diagrams which include anonymous modems conspicuously shaped like the company's data sets. But this resemblance goes unnoticed by most students and has no bearing on the quality of the course material.

The seminar includes fundamentals as well as applications-oriented subjects ranging from transmission theory to terminal selection techniques. The course probably crams too much into the two-day session but the sponsors believe most users cannot easily abandon their jobs for a longer period.

A student's reaction at a recent Institute session gives an indication of the benefits:

"Most of this stuff you get from the school of hard knocks," said Sydney Wolfe, telecommunications technician and network supervisor for National BankAmericard. "It is all relevant and I wish I could get more detail."

Information about the Institute is available from ICC, 7620 N.W. 36th Ave., Miami, Fla., 33147.

Burroughs Adds B771 Terminal

DETROIT — Burroughs has added a remote job entry terminal configuration to its microprogrammed B700 processor series.

The B771 intelligent terminal is designed for use at remote sites where batch transmissions to a central site mainframe are required. The B771 can communicate with most medium to large Burroughs systems including the B2700, B3700, B4700, B6700 and B7700. The memory cycle time is 1 μ sec per two bytes.

The B771 can be equipped with a variety of peripherals including an 80-column card reader with speeds of 300 and 600 card/min., five line printers ranging in speed from 90 line/min. to 750 line/min.; a magnetic tape cassette station; a single line communications control; and a disk cartridge subsystem with a storage capacity of 4.6M bytes.

When the disk capability is included, the B771 can utilize a dynamic interpreter configuration. With this feature, the interpreter is stored on disk and only the segments required by the applications program are transferred into main memory. This allows more space for applica-

tions programs, Burroughs said. The B771 comes in a minimum configuration of 16K which can be expanded in 8K or 16K increments to a maximum of 48K.

The B771 can operate over private or dial-up networks in asynchronous mode up to 1,800 bit/sec or synchronous operation to 9,600 bit/sec. It uses Ascii code.

In addition to operating as an RJE terminal, the B771 can operate off-line for local processing using RPG. But the basic 16K system cannot compile in RPG and the B771 depends on RJE packages in the host system, the company said. The B771 can communicate only with a mainframe and not another B771 using currently announced features.

Prices for the B771 range from \$40,485 to \$98,935 or \$1,023/mo to \$2,267/mo. A typical small system at the lower prices would include a 16K processor with console printer, card reader, and one of the slower printers.

On the high end, a configuration would include a 48K CPU, fast card reader and printer, and the disk subsystem. Deliveries are scheduled for the first quarter of 1974.

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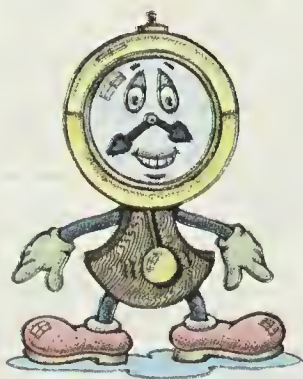


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NRMA Counsel Urges Carrier Support

LOS ANGELES — Users have played a major role in fostering the creation of the specialized carriers and this in turn has created a responsibility to insure their continued viability, according to W.H. Borghesani, telecommunications counsel for the National Retail Merchants Association (NRMA).

Speaking at the annual NRMA conference, Borghesani told the retailers that "having created the new carriers, we must support them. The future of this competitive environment will be determined . . . by users like yourselves."

Describing the effects of the

proposed North Carolina ban on intrastate interconnection, the NRMA lawyer said, "Any successful prohibition of intrastate interconnection would completely negate the federally secured right, by virtue of the Carterfone decision, to interstate interconnection. The intrastate tail cannot wag the interstate dog."

"There is much more to be done at the state level by business communications users in terms of participation in state rate increase proceedings," Borghesani warned. "The dollar amounts involved are simply staggering and invite the con-

stant attention and scrutiny by retailers of such proposals as they would adversely affect such business communications use," he said.

Graphic Display Joins Calculator

BEAVERTON, Ore. — Tektronix has joined its Tek 31 calculator and its 4010-1 Computer Display Terminal to come up with the Tek 31/10 Graphic Calculator System.

The basic system consists of standard Tek 31 and 4010-1 units with a 31/10 interface, along with manuals, overlays, tapes and a graphic software package.

The software package includes function, data and histogram plot programs on mag tape with overlays.

The system costs \$7,500 with deliveries beginning in January from the firm at P.O. Box 500, 97005.

Seminar Covers On-Line Terminals

WASHINGTON, D.C. — Control Data Corp.'s Institute for Advanced Technology will hold two three-day seminars on "terminals in on-line and remote computing systems" Nov. 14-16 at the Barbizon-Plaza Hotel, New York, N.Y., and Dec. 12-14 at the Ramada Rosslyn in Arlington, Va.

The seminars will cover types of applications supported by terminals, basic terminal types, classification of terminals, terminal languages, common carrier offerings and communications media.

Other topics include network elements, noise and distortion, error detection and correction, software, terminal selection, support and operational considerations. A case study will conclude the seminars.

Registration is \$350 from the institute at 5272 River Road, 20016.



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State Board Expected to Hear Special Carrier

TULSA, Okla. — One of the first confrontations between a specialized common carrier and a state regulatory commission was expected to come on Oct. 30 at a hearing for United Video, Inc. (UVI) by the Oklahoma Corporation Commission on its application to provide intrastate service between Oklahoma City and Tulsa.

Up to now the specialized carriers have been authorized for interstate service by the FCC but evidence is growing that state approvals will be more difficult.

The UVI application is being opposed by Southwestern Bell, General Telephone and 18 independent phone companies all operating within the state.

United Video is currently nearing completion of construction on a 700-mile microwave network from Dallas to St. Louis. Through interconnection arrangements with other carriers, UVI will also provide service to New York, Chicago, Atlanta and Houston.

Microprocessor CRT Available

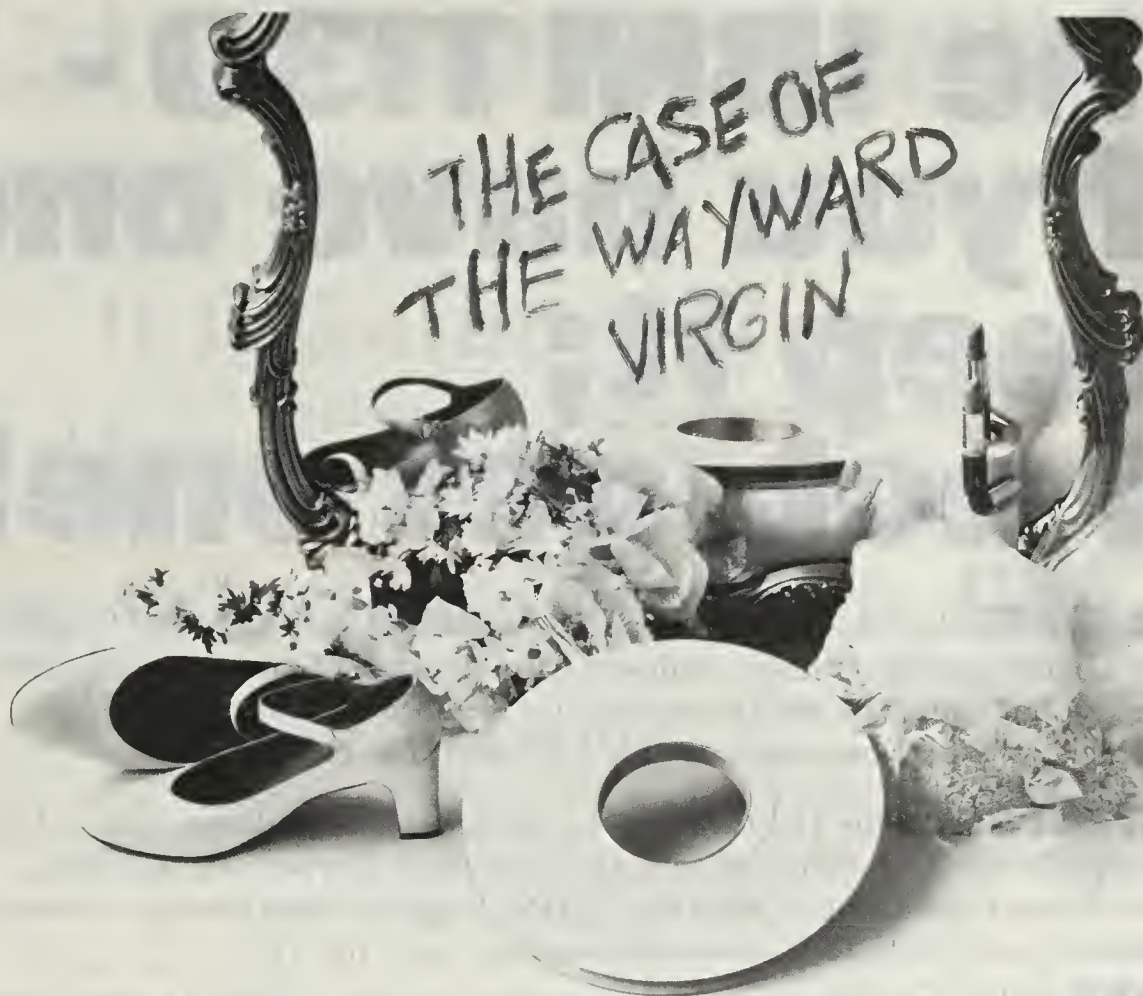
HORSHAM, Pa. — Digi-Log is selling a CRT terminal with a microprocessor in orders of 100 or more.

Because of its bus-oriented design and microprocessor, the Microterm Series 3300 terminal has "virtually unlimited input-output capabilities," according to the firm.

The Microterm can be adapted to any I/O discipline, including polling, and can plug directly into the I/O channel of any computer, the firm stated. The unit can accommodate synchronous, asynchronous, serial and parallel communications interfaces.

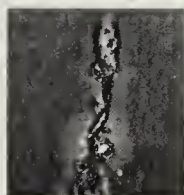
The terminal has 14K bytes of directly addressable memory and has direct memory access capability. Multiple bit/sec rates, which can be software controlled, are available, as are various display configurations, the firm said. The Microterm can emulate a variety of hardware devices, including controllers, and can be programmed to assume the discipline of the host system, a spokesman noted.

Quantity prices for the Microterm start at \$1,600 to \$1,800 with delivery time depending on custom programming required. Digi-Log is on Babylon Road, 19044.



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CW SPECIAL REPORT



Is It Garbage Yet?



October 31, 1973

SPECIAL REPORT Page 19

• Survey Finds 85% of Managers
'Print Only What's Wrong'

• COM, RJE, Spoolers
Other Popular Tools

• But 'Print All' Approach
Still Found in Some Shops

Users Turning to Exception Reports to Limit Output

By Patrick Ward
 and Toni Wiseman
 Of the CW Staff

Data processing managers are turning increasingly to exception reporting to hold down output volume, a recent *Computerworld* survey found.

The DP managers are also showing interest in computer-output-microfilm (COM) units, remote job entry (RJE), and a variety of software modifications including spooling packages to improve output flow.

Over 85% of the DP managers surveyed said they are concentrating on exception reporting, or feel the trend in their installations is in that direction.

"I'm trying to brainwash [top management]," one DP manager confided. "I tell them, 'If you don't see it, it's OK; if you see it, it's wrong.'" But he added that such clear-cut exception reporting is not yet the usual practice.

Another manager with one 100

line/min printer said, "We've been doing quite a bit of exception reporting because of limited printing time. We print mostly exceptions," he noted.

Others said the trend in their shops is towards analysis and forecasting based on stored data,

"[By using COM we hope] we can reduce hard copy but still have data readily available, and also reduce the amount of data that needs to be stored in memory." — a user

rather than either full or exception reporting of the data. Corporate managers want and need to know how their current situations will affect future operations, according to proponents of this approach.

But the "print all" approach is still found in some shops. At

least one manager said he prints everything in the files because "execs like fat, complete reports."

COM Reduces Hard Copy

About one fourth of the DP managers either use or are seriously considering COM units. One manager who is analyzing COM said he hopes that by using it "we can reduce hard copy but still have data readily available, and also reduce the amount of data that needs to be stored in memory."

Another manager did not want to get into any COM system that was "too far advanced," but said he was looking at hardware to transfer data directly from magnetic tape to microfilm to streamline his operation.

To help route data to its specific users, two users have gone to RJE.

Others have turned to improved internal sorting techniques. One said that by sorting

Useful Output the 'In Thing'

Effective business operations depend on effective documentation: clear, human-readable records of what has been done or what should be done. But while records are undeniably critical, for many DP installations, the production of this output is the most time-consuming part of the whole processing cycle.

As the sophistication of the average installation increases — often under pressure from an increasingly critical upper management — tools and techniques have been devised to cope with the output problem. This special report provides an overview of some of these tools and techniques, and case studies of how some users have applied them.

On the Inside

Intelligent Terminals Aid PoultrymenPage 22
 Choosing Interactive T/S Terminals Is a Difficult Task .Page 23
 COM Helps to Contain Paperwork ExplosionPage 26
 Assembler Gives 'Superior' Printing in Cobol Shop ...Page 27

Non-Impact Printer Technologies Range From Scanning Styli to Electrostatic

By Renn Zaphiropoulos
 Special to Computerworld

Non-impact printers cover a multitude of technologies, the only common feature of which is that there is no impact between printing element and paper.

Several years ago Radiation, Inc. developed a high-speed printer for the Lawrence Livermore Laboratory, based on a stationary recording head which contains a linear array of protruding styli that touch the paper. The paper moves in one direction — outwards — and a high-voltage discharge burns the surface of the paper selectively under each stylus.

The main feature of this printer is its extremely high speed. The paper moves at 77 in./sec and printing speed is 30,000 line/min, 60,000 char./sec. In principle, the printer should be capable of

graphics, although it has not been used for this purpose.

In lateral scanning styli machines, a high-current discharge burns the surface of the paper, removes an opaque layer and produces a dark trace. In this case, several styli in a vertical configuration and positioned in a scanning recording head move across the paper producing small dark dots. Motorola used this principle in designing a printer which had several of these heads mounted on one single band that is scanned laterally across.

An improved version of the Motorola machine is the Repco printer which uses the same principle with seven styli moving across the paper. This unit has only one recording head mounted on a carriage.

The ultimate limitation of most scanning styli (Continued on Page 20)

one full disk at a time, he cut his previous sorting time by 90%.

Two users bought Software Design, Inc.'s Grasp to enhance a 370/135 system and a 360/50 system operating under DOS. Others said they are using IBM's Power spooling package.

These packages speed DP operations by "spooling" or moving output destined for the printer to intermediate high-speed storage. After that transfer, the application program continues and the stored lines are moved to the printer as it becomes available, without delaying the original program.

Do Vendors Help?

Only 20% of all those surveyed said their hardware vendor — IBM in each case — had helped them with suggestions for improving the appearance, value or timeliness of their output.

The others apparently felt, either through design or default, that it was up to them to solve

their own problems.

Terry Freeze, a senior programmer/analyst for Allegheny Airlines (an IBM shop) said crisply, "We use our own initiative."

And when Jerry Young, DP manager for Diamond Oil which has an H-120, was asked about support from his vendor, he shot back, "Help from Honeywell? Are you kidding?"

All but one of the managers said they were more or less I/O bound rather than CPU bound. The lone exception was a System/3 user who did "very little reporting but mostly calculation."

Virtually all the DP managers primarily use stock paper for their hard-copy output.

"There's very little done on preprinted forms, except things that go outside," one man said. "Anything that stays inside is on stock."

"We use forms only when absolutely necessary," a branch office user said.

Off-Line Printer Takes 'Taxing' Jobs Off CPU

FALLS CHURCH, Va. — Autotax, Inc. prepares income tax returns for its clients and its workload is characterized by three factors: enormous amounts of printed output during the "tax season" and during the fall; a network of remote, "fully-equipped" through temporary offices; and a uniform approach to solving the DP problems associated with the operation.

The approach the company uses, which DP director Mait Flood urges any user with similar demands to at least consider, centers around a separation of application programs and printing. All printing, except compilations, small jobs and diagnostic messages pro-

duced as an application program executes, is done off-line under the Autotax scheme.

The company acquired an IBM 2927 off-line printer just about a year ago and Flood is quite pleased with it. It has allowed the basic DP work to be handled on a 370/135 mainframe which now has 192K of memory, six disks and five tape units and a 1403 printer, but which until mid-October was limited to 96K memory, three disks and the printer.

The 2927 is essentially a 360/25 that has been crippled by IBM so it does nothing but read magnetic tape and

print on one or two 1403s. Autotax has a dual system installed here and a mix of configurations in its remote and temporary offices.

Separating the actual printing from the 370 mainframe has reduced the amount of time the 135 runs, but Flood sees other advantages as equally important. Even if the mainframe goes down, printing doesn't stop as long as there are print tapes still to be processed. And the "ungodly number of forms" the company uses can all be stored within a few feet of the off-line printer — which is in a different part of the building from the main CPU — a (Continued on Page 22)

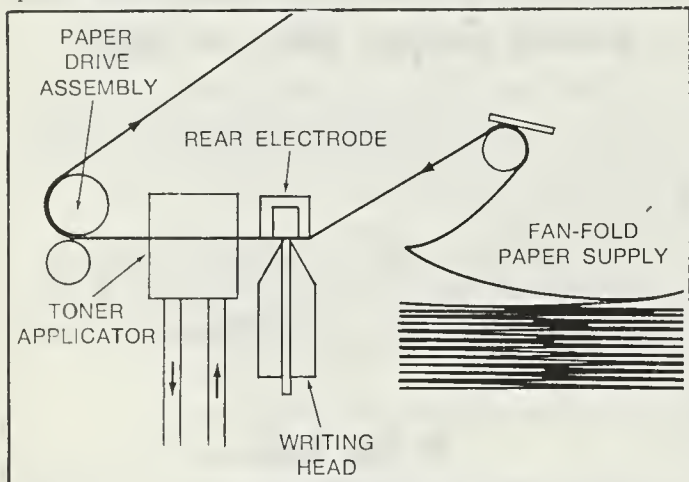
Non-Impact Printer Technologies Range From Scanning Styli to Electrostatic

(Continued from Page 19)

printers is printing speed and reliability. The higher the speed, the less reliability is the general rule.

Another application of the principle of scanning styli is a new development by Interface Associates. The recording head, which has seven styli in a vertical linear array, does not move, but a magnetic belt moves past the head.

The styli record individual dots on the scanning belt by producing local magnetic fields. As in electrostatic writing, the disturbance is not visible immediately; therefore, the belt goes through a toner applicator and the whole image is developed on the belt.



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tial and then are deflected in the X and Y directions as they travel towards the paper by electric fields which correspond to the incoming signal.

The capillary source has to be mechanically connected to an ink supply and by virtue of the ever-present impurities in liquids and in the air, it is not likely to function for a long period of time without failure. The liquid beam cannot start and stop quickly. In addition, the ink has to satisfy two contradictory con-

ditions. It has to be able to dry on the paper quickly, but it should not dry in the capillary. The Inktronic, developed by ITT, uses a stationary recording head containing 40 nozzles as the source of the ink. The droplets from each nozzle can be deflected sideways to produce two adjacent characters on the sheet of paper. The total number of characters is 80 across the paper, hence the 40 nozzles. The main feature of this machine is that it is quiet, printing at 120 line/min, and it uses plain paper.

Ink Jet Machines

Ink jet machines are a further development of an earlier machine developed in Germany for oscillographic recordings. Droplets of ink play the same role as electrons in a CRT. The droplets are charged and therefore become sensitive to electric fields.

The droplets start from a capillary source in the same way electrons start from an oxide-coated cathode. They are accelerated by an appropriate change in poten-

ditions. It has to be able to dry on the paper quickly, but it should not dry in the capillary.

The Inktronic, developed by ITT, uses a stationary recording head containing 40 nozzles as the source of the ink. The droplets from each nozzle can be deflected sideways to produce two adjacent characters on the sheet of paper. The total number of characters is 80 across the paper, hence the 40 nozzles. The main feature of this machine is that it is quiet, printing at 120 line/min, and it uses plain paper.

A. B. Dick has used the same process, but its unit has only one head which moves laterally and has only one nozzle for emitting ink. The letters are written by scanning the head laterally and then deflecting the droplets vertically so the characters can be formed.

Projected on Drum

In xerography, the whole image is either scanned or projected as a whole on a selenium drum which contains a photoconductor on its surface. This changes the photo image into an electrical image.

Dry toner, very fine carbon particles coated with paraffin and electrostatically charged, is cascaded over the electrostatic image on the selenium drum. The black particles stick to the charged areas according to the electrostatic potential developed by the photoconductor.

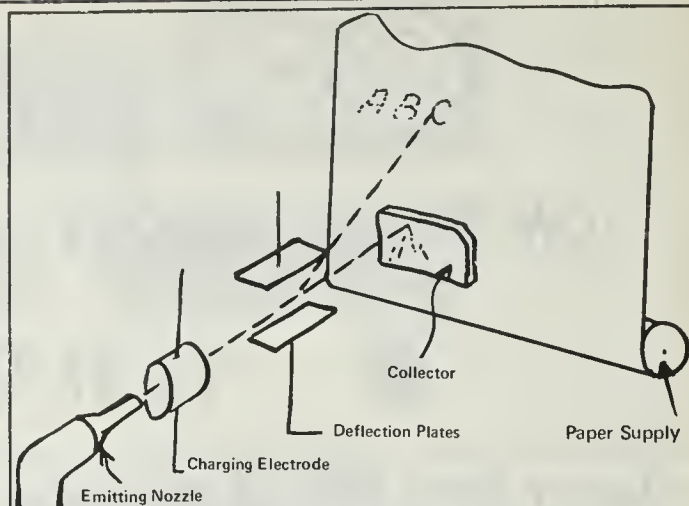
The toner image is transferred onto a piece of paper electrostatically and is fused by a heating cycle during which the paraffin on the toner particles melts and the particles adhere to the paper permanently.

This process has many variables. Assuming that standard photoconductors are used, the intensity of the recording process depends on exposure time and the brightness of the original image. This process uses standard paper and can print a whole page at a time.

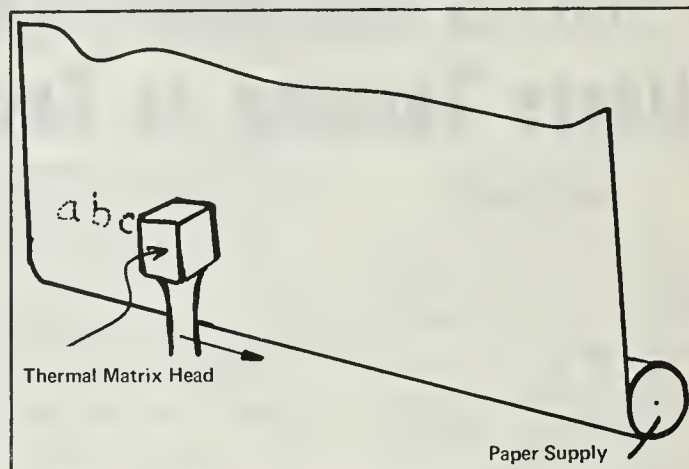
Stylus Heated

Most thermal machines resemble the scanning stylus machines where the top layer was burned off by high current. In thermal writing, the printing depends on a stylus which can fluctuate rapidly in temperature. When a heated stylus comes in contact with a specially coated paper, it produces a contrasting dot on the paper.

One would expect a lot of inertia in a system such as this and



Ink Jet Machine



Thermal Machine

that the stylus could not heat and cool fast enough to do a reasonable job. In fact, there are some machines today which work very well using this principle.

Texas Instruments and Anderson Jacobson are marketing machines which operate on this principle. In both cases a matrix of heated styli moves across the page. The main advantage of the machine is the silent operation.

With electrostatic machines, writing is accomplished by some sort of transfer of electrostatic charges directly onto the paper. Since plain papers do not hold a permanent charge for any period of time, this technique employs a conductive paper substrate which is coated with an insulating layer.

This is another method by which the original writing is invisible (charging the paper) and is rendered visible by further development. This implies a delay between the time the original signal of information is placed on the paper and the time when the information can be retrieved visually.

The first machines employing this principle were developed and marketed by Varian Associates, and a machine of this sort was announced in August 1967.

It was an oscillographic-type recorder. The following year Gould announced another version of this technique, and finally Versatec came onto the scene with the announcement of its first product in 1970.

These electrostatic machines can accept 8-bit code serially or in parallel and they usually contain a one-line buffer for Ascii-generated characters, or a single-line buffer for plotting. By using the appropriate logic, the machines can either print or plot or simultaneously print and plot.

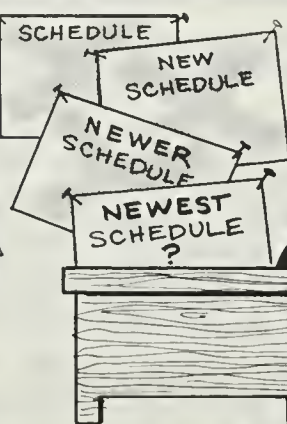
A distinctive factor is that there are no moving parts in the actual writing process. That is, the only moving parts are in connection with the paper emerging from the machine, the blower for drying it and the small pump for circulating the liquid toner.

This technique lends itself to rapid printing at low cost. The process of addressing the nibs is done with transistors. Since the recorded image is put down in a dissected way, that is, in a multiplicity of dots which the eye integrates as it retrieves, it is possible to do graphics as well as alphanumeric.

Zaphiropoulos is president of Versatec Inc.

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With 'Operational' MIS

Intelligent CRTs Aid Poultrymen

EL DORADO, Ark. — Development of a practical, "operational" management information system and the installation of intelligent terminals to retrieve and work with data from remote locations were important factors in a \$10 million gain in profitability for Pillsbury Farms Co., according to group Vice-President Charles M. Harper.

Pillsbury's corporate data center is in Minneapolis, Minn., and includes a mix of equipment ranging from a Honeywell 6080 mainframe to a Honeywell 316 mini with a CDC 1700 and a 355 in between. But the Farms Co.'s poultry growing operations are spread across the Southwest and Southeast, so the subsidiary's headquarters were relocated here.

Chickens are big business for Pillsbury: the company's hatcheries have produced 700,000 chicks a day "and anyway you look at it, that is a big mother," Harper quipped.

The chicks are distributed to growers who also get feed and vet services from Pillsbury. They provide space and labor, then return the chickens to Pillsbury when they are seven or eight

weeks old. And they're paid on how well the chicks have grown in relation to the feed they consumed.

'Biological Process'

"It's a biological process highly dependent on commodity market conditions," Harper said, noting that such a combination could have extremely unpredictable results, unless you have a good data base and a reliable means of getting at it.

The data base must be directly tied to the business "and fairly close in," he went on. Pillsbury's MIS includes price forecasting and results forecasting capabilities, "but no long-range models. Everything we store can be used to make money," in contrast, he noted, to some information systems that are "ethereal."

And the Datapoint 2200 intelligent terminals "seem to be good tools for working with data, both on a local and a remote basis," Harper said. The units can be used in stand-alone mode since they are complete mini-based systems with a programming language and a CRT on which results can be seen immediately. Or they can be

linked to Minneapolis to access data that is broader in scope.

In local mode, the 2200s are used for materials inventory control, grower contract administration and the generation of performance reports so the company knows which operations were effective.

The link to Minneapolis provides the users with access to payroll processing and inventory control — "the classic blocking and tackling operations" in Harper's words — as well as price and results forecasting. And perhaps most critical to the whole system, the remote Pillsbury people have access to a fine-tuned feed formulation modeling program.

This includes information about the nutritive values of various potential feeds and their current or short-term future prices so the optimum feed mix can be determined.

Each of the Farms Co.'s divisions is responsible for its own profit-and-loss, and the balanced use of local and remote data files and processing capabilities has made the entire operation a viable part of the Pillsbury organization, he concluded.

Off-Line Printer Takes Burden Off CPU

(Continued from Page 19)

situation that would be "impossible" in the main computer room.

The 2927 is not Autotax's first attempt at solving its paperwork crunch by separating the DP and the printing, but it clearly is the best solution so far, in Flood's opinion. The IBM off-line printer replaced a CMC Data Print system which, on the surface, was similar to the new unit. It, too, was based on the IBM 1403 printer and at the Autotax site at least, was also a dual printer configuration.

But Flood had severe problems whenever the system needed servicing, since IBM maintained the printers while CMC supported the mini that drove the system and the controller. Unfortunately, Flood noted, there was some sort of defect in the controller which "blew the print hammers with disturbing regularity."

CMC required that it be called first or it would not necessarily assume the cost of any work IBM did to bring the printers back up to functional status.

The 2927 involved just one supplier and because IBM is also the supplier of the mainframe, Flood needed no additional maintenance agreement to be sure of 24-hour service on the off-line equipment.

Unique Rental Setup

The 2927s Autotax has put into its nationwide offices have been utilized in, perhaps, a unique way. The company rents computer time from user sites local to each office to execute the application programs and generate the print tapes, which are then brought back to the "printing factory" for production.

Again, as in the home office situation, this separation means a reduction in the amount of

time the borrowed mainframe is used and a complete elimination of the problem of lugging boxes of forms to and from the installation being used for the program runs. Without having to move the forms, it is also easier to shift from site to site as facility availability changes.

Back at the local Autotax office, workers can produce as many copies of each form as they need, including, for example, replacement of any that are accidentally destroyed or soiled beyond use.

The company isn't completely happy with the 2927s, Flood continued, noting that IBM is so determined to keep this unit limited to a slave status that it refuses to make a console typewriter available even for operator messages, even though such a typewriter is part of the 360/25 on which the 2927 is based.

And IBM has no real software

support for the off-line printer, especially in the dual configuration Autotax uses. IBM specifies that BPS (Basic Processing System) coding must be used and programs have to be developed on a host computer and loaded into the 2927 from magnetic tape.

However, there are a growing number of users of this special IBM system — it is available only on a Request for Price Quotation (RPQ) basis — and one of them, Value Engineering in Alexandria, Va., modified its single-printer software to drive either a single or a dual system and has made the updated package available [CW, Oct. 24].

The 2927 costs Autotax "about \$1800/mo" for the CPU, tape units and controller. Hanging additional peripherals on the 135 to get the same capabilities on that system would, he thought, cost considerably more.

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Choosing Interactive T/S Terminal a Difficult Task

By P. K. Ciolfi

Special to Computerworld

Because of the plethora of terminals on the market, the time-sharing user looking for the optimum terminal faces a difficult task.

There are CRTs and at least four different types of interactive terminals with wheel, belt, disk or thermal printer mechanisms. Auxiliary numeric keyboards add extra capabilities, special covers deaden noise, tape cassetts, tape/punches and readers, winders and you-name-its can be added to basic terminals to get the "right" machine.

At the same time, almost every manufacturer claims his equipment meets the most needs in the field, offers the best prices and service policies.

'Workhorse' of the Industry

If the T/S system user is satisfied with a speed of 10 char./sec, nothing matches the teletypewriter for price. It simply is the lowest cost machine available. That is why it is considered the "workhorse" of the industry and will continue to be so, even though peak deliveries occurred in 1972.

From the operator's point of view, it also has excellent "visibility." This means the operator can see what he just typed.

And for all the abusive comments directed at teletypewriters when they gasp, wheeze and die, mean time to repair averages about 20 minutes. The only trouble is that the machines break down every four to five months, so while they are only down for a short time, the frequency of breakdowns makes them less desirable.

The classic teletypewriter lacks lower-case characters, has no back space and only 72 print positions. Acoustic hoods are available, and they work, but they cost extra.

Just because the older TTY models have been successful, however, the manufacturers haven't stopped development. One new model was delivered initially this past summer, and features a 132-position carriage, upper/lower case, backspacing, APL character set (optional) and quieter operation. Unfortunately it hasn't been in the field long enough to see if it can take the day-to-day beating of its older brother.

Faster Not Always Better

Users should be careful to evaluate 30 char./sec vs 10 char./sec machines correctly. Compare KSR models and ASRs independently, and be careful not to replace an ASR teletypewriter with a KSR 30 char./sec printer if the user has a reasonable amount of input. The result would be the installation of a machine that is just too powerful for an operator who "hunts and pecks" on a machine that can accept greater speeds.

The availability of 30 char./sec machines has created the most dramatic changes recently. Interactive terminal printers utilizing helical spinning wheels, positioned perpendicular to the page, were the earliest on the market. This kind of terminal features up to 132 print positions and is adjustable, but print quality is light due to the use of Porelon rollers instead of inked ribbons. New companies entering the marketplace offer backspacing, upper/lower case, tabbing and so on.

Also new on the market is a spinning wheel "daisy," mounted parallel to the paper, rather than perpendicular. Offered first as a minicomputer-driven printer, this equipment can now be obtained as a complete terminal including keyboard. But the manufacturer has not considered modular electronics packaging, so that all circuits are on one large board, meaning complex repairs.

A distinct advantage of this equipment, though, is excellent print quality. And the printer is quiet.

On the negative side, this type of terminal requires buffered electronics (at

extra cost) because its print speed varies from about 20- to 40 char./sec, and it has poor visibility — 3-1/2 in. of the typing line is obscured by the ribbon mechanism, although a "view feature," if available, would help solve the problem.

Matrix printers haven't yet had much of an impact on T/S terminals. While print quality varies, and they aren't too quiet, high speed is possible. Time-sharing use is still limited generally to 30 char./sec and matrix printers will be a factor to consider in the future.

Belt printers, although in wide use generally, offer no significant advantages over wheels and daisies, but are quiet, have upper/lower case and can be tabbed. However, interaction is difficult because each character must be keyed, and the operator must wait for the ribbon mechanism to complete its cycle before he can see the character typed.

Consequently it is a slow, almost painful procedure to enter data, unless the full line is typed before viewing for errors. Since most people elect to type the full

line before viewing, much time is wasted by those who make errors.

Thermal Revolution

In the 30 char./sec range, the advent of thermal printers has revolutionized T/S terminals. At least three manufacturers produce portable terminals, making time-sharing available virtually anywhere there is a telephone.

Thermal printers are generally quieter than other devices, although among them, some are louder than others. Only single-copy paper can be used, and this paper is expensive. Print quality is fair — it is difficult to make copies — and narrow 8-1/2 in. carriages are limited.

The visibility of portables is generally good, they weigh under 30 pounds and some fit under an airline seat, and have much higher mean time between failures than mechanical devices.

If there appears to be a lack of standardization in printers, consider the more rapidly expanding sophisticated CRT market. No two users want exactly the

same equipment and no two manufacturers make equipment that is even interchangeable, so reprogramming is a constant consideration. And reliability, usually considered to be high because of our familiarity with television, is the biggest single CRT problem!

There are trends, however. Black/white phosphor screens are becoming more popular than green, orange or other colors; the highest selling units have 25 lines by 72 columns, complete edit packages, reverse video, blinking, addressable cursor, recall from memory (scrolling) and special function keys. Prices have come down in recent years, but cannot go much lower, and if standardization becomes widespread, the CRT user will be in a better position to realistically evaluate CRTs vs other devices.

Phillip K. Ciolfi is president of National Data Industries, Inc., a single-source vendor of several types of data communications terminals, maintenance and service operating in the New England-New York area.

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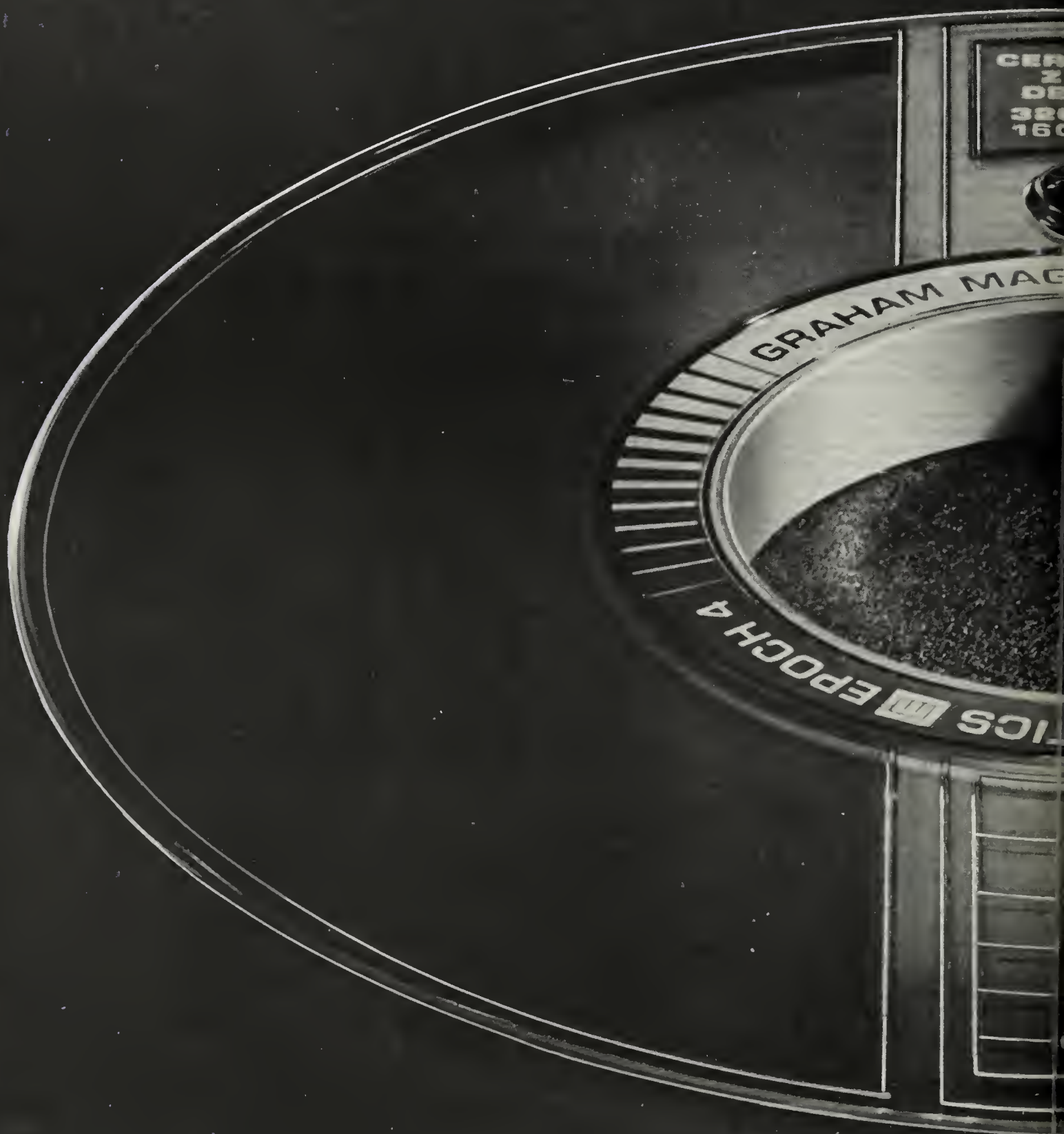
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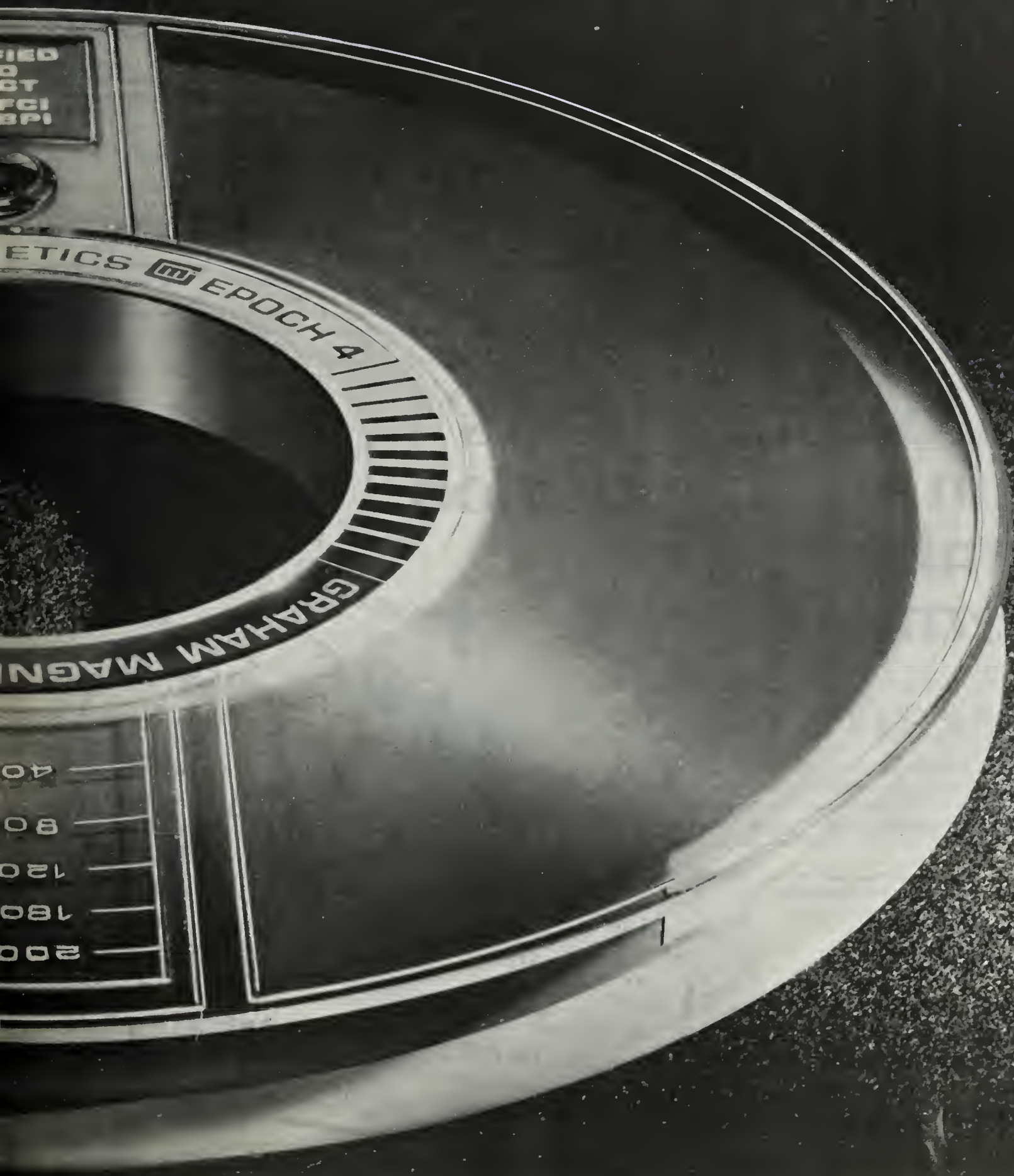
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Three Basic Technologies

COM Helps Contain Paperwork Explosion

By Don M. Avedon

Special to Computerworld

Over the past several years, American industry, as well as the scientific community, has turned increasingly to the use of computers and microfilm as means of controlling what is referred to as the "paperwork explosion." Computers and microfilm have been generally used independently to cope with the same problem.

Both have been successful, but neither alone has completely solved the problem. The effect of combining microfilm and the computer in a system for information handling may turn out to be more dramatic than the effect of either alone.

The computer-output-microfilm (COM) unit is a device which records computer data on microfilm in human-readable form. It is a recorder which may be connected directly to a computer for on-line operation, or to a magnetic tape for off-line operation. The magnetic tape unit "reads" information into the COM from a tape previously recorded by the computer.

The two types of computer output

microfilmers in use now are alphanumeric and graphic recorders. As the name implies, the alphanumeric recorder produces characters only (the alphabet, numbers and special symbols), usually records at a very high speed and can be used in place of up to 30 impact printers.

The graphic recorder can draw lines, curves and characters which result in engineering drawings, charts and plotted data.

COM began as a scientific device used for plotting technical data in graphic form. Now it is being used extensively by business for alphanumerics as a replacement for impact printers.

It is expected that business management will soon realize the advantages to be gained from the graphic type of COM by plotting and presenting business information in graphic form instead of as alphanumerics, or by having draftsmen manually prepare charts from alphanumeric data.

Thousands of computers in use today do not yield full capacity as they are slowed down by impact printer output devices which, in addition, produce too much paper. Mountains of paper printout

are smothering the very efficiencies for which computers were designed.

Vital information does not get into the hands of the right people in the right places in the right form in time for decision making. COM recorders can solve this problem because of the many advantages they have over impact printing systems:

- Printing at computer tape speeds
- Forms printed with data simultaneously
- Graphic capability
- Retrieval coding placed on records as created
- Smaller records storage
- Reduced cost of supplies and material
- Weight of information significantly reduced
- Microfilm does not require decollating, bursting or binding.

Three Technologies

There are three basic COM recording technologies in use today: CRT, electron beam, and fiber optics and light-emitting diodes.

The computer-output-microfilmer, as the name implies, produces computer-generated microfilm records with no intervening paper copy by converting the computer digital signals to voltages which are applied to a CRT.

The conversion process results in information being displayed on the CRT screen in human-readable form. The microfilm record is produced by photographing the displayed information. The basic process is illustrated in Figure 1.

CRT systems use several methods of generating characters. Most systems use a "stroke" generator. In this type of system a spot is deflected to trace the shape of the character desired. About 16 strokes

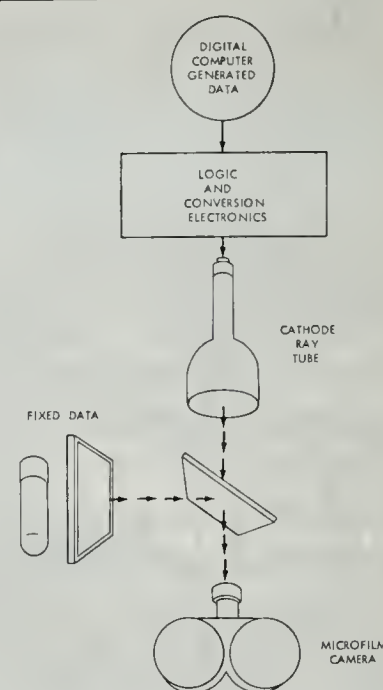


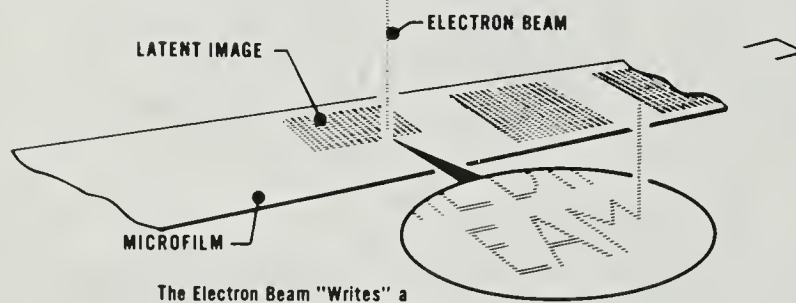
Figure 1. CRT Microfilm Recording are used on an average per character desired.

Stromberg Datagraphix has developed a special CRT called a Charactron Shaped Beam Tube. The Charactron tube creates an image by directing an electronic beam through individual characters cut in a matrix which is a thin, precise disk with alphanumeric and symbolic characters etched through it.

The matrix located within the neck of the tube extrudes the beam in the shape of the character being printed. This has the effect of stenciling each character onto the tube face.

The second method of recording is done directly on microfilm using an electron beam. Using the stroke method, much like that of a pencil writing on paper, the electron beam writes a latent image directly on dry silver microfilm.

(Continued on Page 27)



The Electron Beam "Writes" a Latent Image on Dry-silver Microfilm.

Figure 2. Electron Beam Recording on Microfilm

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Berlin	Nov. 20-22	Berlin Hilton Hotel
Munich	Nov. 27-30	System '73/Munich Fair Grounds

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Assembler Gives 'Superior' Printing in Cobol Shop

CHICAGO — "Cobol has terrible support for printing operations, with SPACE AFTER print, for example," said Jack Reitz, DP director for Superior Coffee Co., "so we use Assembler coding for that function, even though we're a Cobol shop for most of our programming."

"The Assembler code not only gives us more flexible printing from our programs," he added, "but it also means that we're really device independent." Even if the printer is down, the output can be put out on tape or disk so the processing cycle can be kept moving, he noted.

Superior has two programmers — "Our maximum was three" — and the corporate center handles most of the normal accounting applications: billing; accounts receivable and sales analysis; "and, of course, payroll." The center is just getting into accounts payable and has "a little bit" of inventory accounting, particularly for the trucks.

The company recently acquired the gen-

COM Helps Contain Paperwork Explosion

(Continued from Page 26)

The electron beam originates at the cathode of the electron gun, located on the top of sealed housing. Electrostatic plates and electromagnetic yokes, or magnetic lenses, deflect the beam to form characters and position them on the microfilm frame.

The housing is similar in principle to a CRT except in place of a phosphor screen there is a small aperture through which the beam passes to write directly on the microfilm. Vacuum pumps reduce the air pressure within the housing to a level low enough to facilitate generation and precise control of the beam.

Because the beam has practically no inertia, it can be deflected, or modulated, rapidly enough to keep pace with the data transfer rates of the tape drive.

A third method of recording on microfilm forms characters using a translation matrix, a bank of light-emitting diodes, and a fiber optics bundle. Digital signals are directed to the diodes by the translation matrix.

Light from pulsed diodes is transmitted in turn through fiber optic strands to form a display of alphanumeric characters on the face of the fiber optics assembly. Using a lens and film transport, images of the characters on the face of the fiber optic are recorded on microfilm.

Choosing Right Unit

A number of factors have to be considered in selecting an appropriate COM recorder. The "menu" that follows is given, deliberately, in alphabetic order. The importance of each has to be determined by the individual installation.

- Character set and font style
- Cost
- Delivery schedule
- Equipment reliability
- Error detection capabilities
- Film size and format
- Film supply
- Forms overlay
- Image quality
- Job setup
- Magnetic tape format
- Manufacturer's reputation
- Operating environment requirements
- Plotting capability
- Programming and software
- Retrieval codes
- Service
- Throughput rate
- Transfer rate
- Type: alphanumeric or graphic

Don M. Avedon is technical director of the National Microfilm Association.

About the Author

This special report was prepared by Don Leavitt, Computerworld's Software Editor.

eral ledger package from Infonational of San Diego and Reitz said he "has nothing but praise for those guys."

Superior has a 96K 360/30 operating under DOS, "a medium-sized installation," in Reitz's view, with eight 2314-style disk drives from Tracor, two 2401 tape drives, a "slow" 1442 card reader and a 1403 N1 line printer.

A Universal Chain?

The printer has a conventional upper-case-only alphanumeric font, although Reitz anticipates getting a Universal chain when the company moves to a 370, "probably in another two years." He admitted being unsure how much real value Superior would gain from the more comprehensive character set, but he thought the additional special characters would help the appearance of some of his reports.

He read about a non-impact printer that is supposed to be able to produce 8,000 line/min and this, he felt, had a lot of

potential for DP in general, as well as Superior in particular. At that speed, he said, users could repeat the entire printing program several times — to get more than one copy of reports — and it could still be

"The Assembler code not only gives us more flexible printing from our programs, but it also means that we're really device independent." — Jack Reitz

done quicker than generating multiple copies in one pass on a conventional printer.

"I think the day is coming — maybe it's already here — for faster print systems," he mused.

Even if faster printers are available, however, Superior is now working to develop an on-line system so accounting clerks will be able to respond quickly and accurately to telephone inquiries about orders in process.

Current design specifications for this new capability call for IBM 3270 display stations to be linked into the 360/30 and for the whole operation to be up and running by March of next year.

At least until the system is in place, Superior's DP operations are essentially batch-oriented, and not really time-critical, the DP director said.


There is a good deal of printed output produced by the center and mailed to distribution and coffee processing plants and some 23 offices located around the country. Since this phase of the operation is "mail-bound" more than I/O-bound, he added, the company hasn't even considered the use of spoolers to speed the process.

Information for Superior's Detroit and Indianapolis locations is handled differently. Communications with those sites, Reitz noted, is through magnetic tape and Honeywell transmission units.

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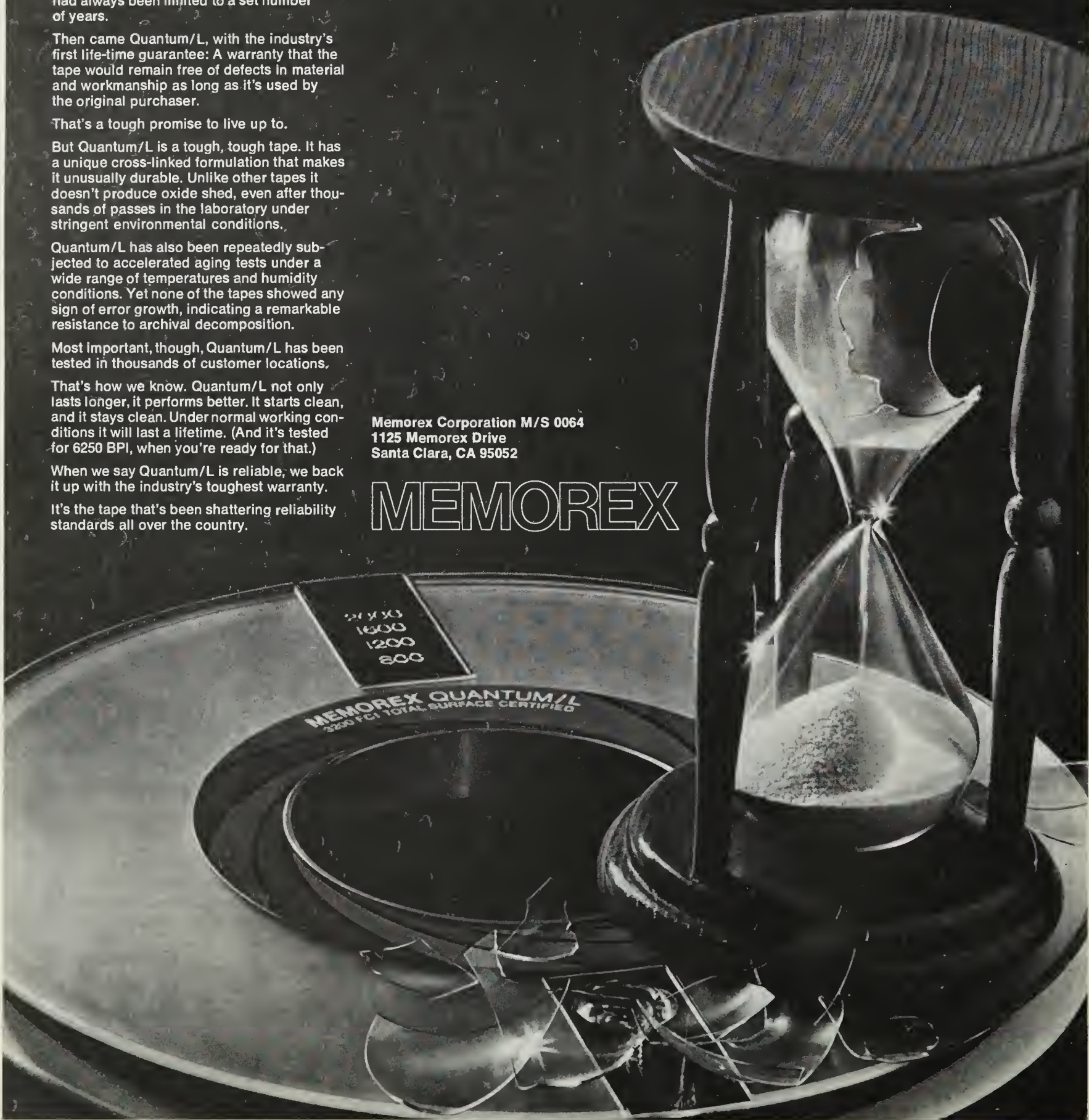
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Bits & Pieces

IEEE Forms Subcommittee On Interface Standards

SILVER SPRING, Md. — The IEEE Computer Society Standards Committee is organizing a subcommittee on interface standards, with particular emphasis on standards for interface from computer mainframes to memories and peripheral devices.

Individuals who are interested in contributing information or expertise on this project should contact Charles Rosenthal, Bell Telephone Laboratories, Mountain Ave., Murray Hill, N.J. 07194.

Ball Pen Talks to CPU

MENLO PARK, Calif. — A "talking" ball point pen capable of transmitting signals to a central processor as a person hand-prints characters is under development by Stanford Research Institute.

In the present laboratory version, the pen is hooked to an audio unit as well as a teleprinter, so that as a person writes, the characters appear on the video screen of the teleprinter and are spoken by the audio unit.

Estimates of cost for the finished version range from \$25 to \$50, according to a staff scientist. There is no firm date for any commercial release of the pen.

Conditioner Counters Line Problems

SAN DIEGO, Calif. — Deltec Corp. is offering an ac line conditioner to counter input power line problems.

The DLC 1260 "Ivacon" series was developed to eliminate brownout, noise and ground loop system problems, the firm stated. Designed for installation as the system power panel, the units relieve the need for circuit breakers, current and voltage indicators, and supply regulated, noise-free ac power to computer systems, the firm stated.

The input to the DLC 1260 is 75 Vac to 130 Vac with an output of 117 Vac \pm 3% and will supply 1,200 Va. Greater than 120 db of noise suppression and common-mode rejection is offered.

Prices are from \$50 per 100 va from the firm at 3849 Gaines St., 92110.

Newspapers Offered Tape Reader

PRINCETON JUNCTION, N.J. — A high-speed photoelectric tape reader designed for the newspaper production environment is available from Tal-Star Computer Systems, Inc.

The Tal-Star unit reads information from 5-, 6-, 7- or 8-level punched or mylar tape at a speed of 300 char./sec.

Features include only one operator control, the power-on switch and a variable tape guide for quick tape width adjustments.

The photoelectric reader costs \$850 from Box T1000, 08550.

Built on Common Architecture

Univac 90/60 Basis of Future Systems

By Michael Weinstein
Of the CW Staff

Univac's release of the 90/60 [CW, Oct. 24] has importance beyond the shape and size of the mainframe. Like a jigsaw puzzle piece, the 90/60 fits right in the center giving users a focal point from which to speculate on the direction Univac is going to take with future systems.

Strong signals point to the end of plated wire memories, use of microcoding as the driving force for new computers, and a solidified product line built around a common architecture — as in IBM's 360 and 370 series.

Univac appears to have chosen IBM's

Analysis

operating specifications as the benchmark that new systems must exceed. In addition, the demise — in their present form — of the lower members of the 9000 series seems likely.

Semiconductor is Cheaper

The move to semiconductor memory, first on the 9700, renamed the 90/70, and now on the 90/60 is a clear indication that Univac's association with plated wire memories is over. The reason for moving to semiconductor (MOS) is cost. Users can have the same speed with wire plated, a spokesman said, but the costs are markedly higher for production.

The move to microcoding fits in with Univac's stated goal of going after present and potential IBM users. In addition to other benefits, microcoding makes emulation easier — change the microprograms and the user can change the system operation.

What Univac must do is make a better system for current users and at the same time include features and emulators to draw potential and actual users away from IBM.

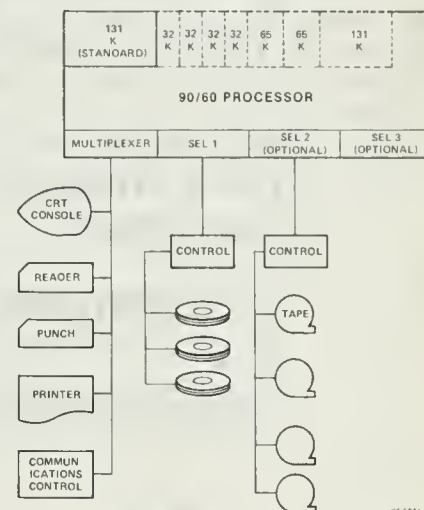
Univac officials feel there is no trade-off between these efforts, yet to lure the IBM user, Univac will have to make the 90/60 act like a faster and larger 360/30 or 360/40.

The danger here is the user who changes may become a Univac user in name only, still operating his system as though it were of IBM vintage.

Hardware Advantage?

The 90/60 has a hardware relocation feature which is used to dynamically change the program starting address. This technique acts to provide flexible roll-in, roll-out capability as the supervisor can locate the rolled-in program in any portion of the main storage by adjusting the associated relocation address.

An indirect addressing feature allows the user to have a simpler entry to re-entrant system routines under the control of the supervisor. Potential benefits of indirect addressing include no interrupt



A typical Univac 90/60 system configuration.

occurrence, the ability of the supervisor to move subroutines without impacting user programs, the reduction of user program sizes and the placement of application routines or data bases under supervisor control.

However, these added features represent a potential degrading factor in the peripherals area. Both techniques rely heavily on a form of swapping to and from the disk subsystem. Since central processors are relatively fast compared to access times for the disk subsystem, the slower disk speed acts to define the speed for the entire operation. For frequently accessed programs and/or data, the absence of a higher speed drum puts a top bound on the speed of swapping operations that can offset the faster speed of the central processor.

The answer would appear to be to add a drum or other fixed-head device to the 90/60 — as Univac has done with the next step up: the 90/70.

A Univac official said drum usage could increase system throughput, but stated the 90/60 would be going after the Model 135, and presently it is 60% faster without the drum.

The 90/60 is the first of a new series with Univac intending to release new machines for the next 18 months — one every six months.

Since the 90/60 fills in the medium-scale range of Univac's product line with even spacing between machines, the expected minimum of three new machines over the next year will have to fit somewhere and possibly replace something.

A guarded speculation is that the 9400 series is marked for replacement over time — at least in its current form — followed by lower members of the 9000 series.

Minicomputer Maker Introduces User's Buyer Protection Plan

NATICK, Mass. — Prime Computer, Inc. is offering users a buyer protection plan: a two-year trade-in schedule on system components and a guarantee on software compatibility between systems.

The hardware coverage is broken into standard features and options, each with its own trade-in schedule. Basic system components such as the central processor and memory are listed as standard features to which options can be added.

A 50% credit is given when trading in the following options for the same options on a larger machine: Direct Memory Channel/Direct Memory Transfer (DMC/DMT), TTY/PTR auto load, disk auto load, magnetic tape auto load, hardware multiply/divide, 65K bytes addressability, micro verification, and extended control store capability. As an example of the trade-in possibilities, a Prime 200 user can trade in his machine plus \$5,000 and upgrade to a Model 300. The 300 bought outright would cost \$12,000.

In addition, users can keep the original processor as a spare for \$1,000. The

keep-or-trade capability allows users to keep the original chassis, power supply and memories, or selectively upgrade specified components.

Prime has also initiated a loan system for damaged components. For \$200, users are shipped spare boards to be used while the damaged boards are being repaired at a service center.

Users are guaranteed the ability to write programs in any language under control of any development system with associated support packages.

This means a user who moves from one system to another merely takes his software as is, loads and goes, a spokesman said.

Program and data compatibility exists between DOS, DOS-VM, RTOS, RTOS-VM and stand-alone software systems. The inclusion of Ansi-standard Fortran IV with real-time extensions allows programs written for other systems to be run on the Prime system, he added.

The firm is located at 23 Strathmore Road, 01760.

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Tape Cleaner/Evaluator Handles Densities up to 6,250 Bit/in.

ROCKVILLE, Md. — The CE-70 from General Kinetics, Inc. is a computer tape cleaner and evaluator series consisting of five models designed to handle tapes with densities up to 6,250 bit/in.

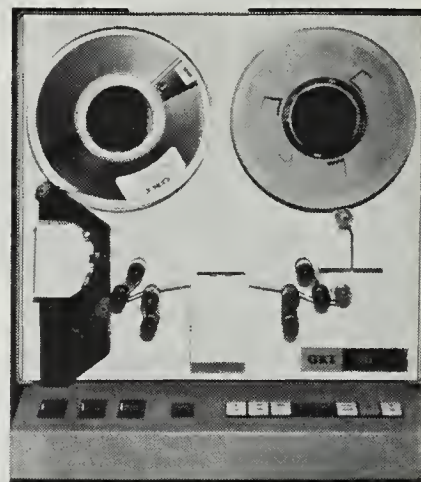
Cleaning and testing operations are independent so live tapes can be cleaned without affecting data recorded on them, a spokesman said.

An endless loop blade cleaner (rated 96% effective) removes dirt, dust and oxide lumps, and tissue wipers collect and retain these particles. Each tape is wiped twice on each side, before and after passing over the blade cleaner; then the same process is repeated in the opposite direction.

The five models offered are CE-70A (7-track, 800 bit/in.); CE-70B (9-track, 800 bit/in.); CE-70C (9-track, selectable 800 bit/in. or 1,600 bit/in.); CE-70D (7- or 9-track, selectable 800 bit/in. or 1,600 bit/in.); and CE-70E (9-track, selectable

1,600 bit/in. or 6,250 bit/in.).

The units range from \$7,500 to \$9,500 from the firm at 12300 Parklawn Drive, 20852.



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speeds (100 and 165 cps) can be supported on a single control unit. **Ease of operation.** Non-glare screen and adaptive keyboard designed specifically to reduce training, errors and fatigue. **And that's just the beginning . . .**

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Tape Unit Designed For Scientific Users

WALTHAM, Mass. — Scientific users who record large amounts of data for later computer processing can obtain an interface and controller system that performs the task of arranging the data along with other pieces of status information such as experiment code, real-time clock and counters in a preformatted fashion on digital tapes.

The unit, from Whittaker Corp., may be specified by configuration to meet individual user needs. The input sample can be written on tape synchronously at predetermined increments of time or asynchronously, and can include any or all of these items: data, real time clock, experimental code(s), and a subject or operator controlled counter for stimulus slides.

After each predetermined number of sample points is recorded, an intergap record is placed on the tape to cut to a minimum the data loss due to parity errors, a spokesman said.

The tape may be 7- or 9-track IBM-compatible.

The system costs between \$3,000 and \$5,000, depending on user configuration, from the firm at 335 Bear Hill Road, 02154.

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Conference Features Multiple Workshops On Privacy, Security

NEW YORK — "Data Collection, Information Systems and the Individual's Liberties" will be discussed by Dr. Alan Westin at the Fourth Annual Conference of Human Resource Systems Users.

Societies/ User Groups

The conference, Nov. 7-9 at the Barbizon-Plaza here, will cover human resources in government and management, as well as data banks and privacy.

Workshops of particular interest to DP attendees include sessions on interface, documentation/procedures, new peripherals, and data management-based systems.

Workshops on security and report output techniques will also be held.

A schedule of 29 workshops will focus on questions such as "What is being done for more effective salary administration and budget control?" and "What has been done in establishing and monitoring Affirmative Action Programs with a computer?" Attendees will be able to choose six of the 29 workshops.

Registration for the conference is \$350. Further information can be obtained from Ann Burnett, Information Science Inc., New City, N.Y. 10956.

Meeting Identifies Bankers' Problems

PHILADELPHIA — Peer group sessions for bankers are the key to this year's Eastern Regional Operations and Automation Workshop.

Representative topics include quality control techniques, minicomputers, DP planning considerations, computer center security, on-line testing and debugging, and software package considerations.

Special Interest Sessions

The workshop, Nov. 19-20 at the Philadelphia Marriott Motor Hotel here, will also feature special interest group sessions on subjects ranging from on-line teller terminals and COM, to virtual storage and data base decision considerations.

Further information is available from the workshop sponsor, the American Bankers Association, 1120 Connecticut Ave., N.W., Washington, D.C. 20036.

Call For Papers

The 1974 IEEE International Conference on Communications, June 17-19, 1974, Minneapolis, Minn.

Papers are solicited in the technical areas of computer and data communications systems, communications switching, satellite communications and signal processing. Papers in related areas are welcome.

Deadline for receipt of the papers is Dec. 17, 1973.

Prospective authors are requested to send five copies of both the paper and a one-page summary to Dr. M.S. Ulstad, ICC '74, P.O. Box 35366, Minneapolis, Minn. 55435.

Second International Symposium on Criminal Justice Information and Statistics Systems, sponsored by Project Search, April 30-May 2, 1974, San Francisco, Calif.

Papers are solicited on systems design, applications and evaluation.

A 200 word abstract must be submitted by Dec. 15, 1973 to Thadd McNamara, Search Symposium Coordinator, California Crime Technological Research Foundation, 7171 Bowling Drive, Suite 190, Sacramento, Calif. 95823.

Press, Business, Citizens Join In Seminar on DP and Society

BOSTON — Journalists, technical specialists in communications, economists, regulatory specialists, and businessmen will be among the panelists focusing on the social impact of computers and broadband communications channels at a Nov. 7 meeting here.

The seminar, cosponsored by Boston University and the John Hancock Mutual Life Insurance Co., is aimed at business, the press and general citizens. Three concurrent morning panels will address the three audience groups.

The luncheon speaker, Congresswoman Margaret Heckler (R-Mass.), will discuss the issue of privacy in relation to new resolutions she has introduced into Congress which would establish a subcommittee to investigate the citizen's right to privacy.

An afternoon session entitled "The New Media and the Right of Privacy" will delve into the questions of wire taps, data banks, and possible legal and technical safeguards against abuses. Featured speakers will be Arthur R. Miller of the Massachusetts Privacy and Security Commission, Robert Farno of the MIT Dept. of Electrical Engineering, and Robert Courtney of IBM Computer Laboratories.

There will be a minimal registration fee. Further information is available from Lori Klinghoffer, Boston University School of Public Communication, 640 Commonwealth Ave., 02215.

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If you have a voice in company training, you have a responsibility to ask yourself these questions:



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- 3) Are you now conducting training programs but lack certain methods, materials or instructor talent?
- 4) Is there a gap between company goals and technical capabilities, i.e., need for updating skills in Data Base Management, Data Communications, Business Systems Analysis and Design, Virtual Storage, Project Management, etc.?
- 5) Is your in-house training capability providing the quality and productivity levels you require?

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Promote Good Practices

ICCP Initiating Moves to Administer Certification

By Toni Wiseman
Of the CW Staff

"To foster, promote, develop and conduct scientific inquiry and research into any of the several activities related to the development and recognition of knowledge and competence among personnel in the computer and information systems industry..."

This declaration is the first tenet of the Institute for Certification of Computer Professionals (ICCP) as set forth in its certificate of incorporation.

ICCP, formerly known as the Computer Foundation, is a federation of societies dedicated to the improvement of standards, the development of testing and evaluation for members of the computer industry, and the promotion of standards of good practice.

The initial effort of the institute will include the administration of the Certificate in Data Processing and the Regis-

tered Business Programmers examinations, which were developed and sponsored to date by the Data Processing Management Association.

The institute was incorporated as a non-stock corporation in Delaware on Aug. 13, 1973. Its charter was accepted

Societies/ User Groups

Sept. 24, 1973, by the 10 members of the Computer Foundation Organizing Committee.

Charter Members

At present, there are eight charter members, each of which paid \$1,000 for its membership. These include the Association for Computing Machinery (ACM), Association of Computer Programmers and Analysts (Acpa), Association for

Educational Data Systems (AEDS), Automation 1 Association (A1A), Data Processing Management Association (DPMA), Society of Professional Data Processors (SPDP), Society of Certified Data Processors (SCDP), and the Society of Data Educators (SDE).

In addition to these charter members, two other societies are in "various stages" of formal recognition and could become charter members. They are the Computer Society of the Institute of Electrical and Electronics Engineers and the Canadian Information Processing Society.

Membership in ICCP is open to "any association, corporation, society or similar group, the membership of which consists primarily of individuals engaged in or interested in activities related to the computer and information systems industries, which is not organized or operated principally for pecuniary gain."

Other membership requirements include

a minimum of 500 individual members in the member society or association, the subscription of said group to a code of professional conduct, and membership restrictions related only to professional credentials.

Several charter associations do not meet the minimum membership requirement. These associations, according to an ICCP spokesman, were given a waiver that will last one year.

During that waiver period they have to bring their membership up to the minimum requirement of 500. If within a year, the spokesman said, an independent audit determines that they have not met the full requirements, they will be dropped from membership. This waiver, he added, was granted only to "charter members."

Institute membership is divided into three classifications based on the number of individual members within the group. Associations with 500-999 members will be designated Class I; 1,000 to 9,999 members, Class II; and more than 10,000 members, Class III.

Each member will designate two directors to sit on the board of directors of the corporation. Directors — or their proxies — who are members of a Class I group, will have one vote in decisions; Class II member directors, two votes; and Class III directors, three votes.

Perhaps the most outstanding feature of the institute is its concern for giving the smaller societies a more equitable voice in the decision-making process, an ICCP official said. Because amendments to the constitution require a unanimous vote, each member society has equal power in making constitutional changes, according to Jack A. Beyer, chairman, ICCP public information subcommittee.

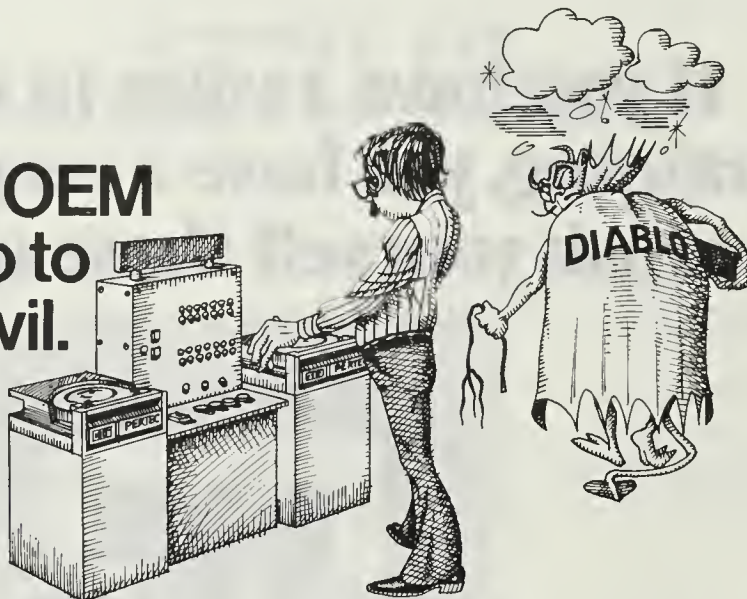
In addition, the three-to-one ratio of votes between the largest societies and the smaller ones on the board of directors is much smaller than the actual ratio of their memberships, he noted.

At all meetings of the board of directors, a quorum — per capita, not per vote — will be required for the transaction of business. An affirmative majority vote will carry a motion.

The by-laws of the Institute provide that no officer shall be allowed to succeed himself more than once. Officers have been elected to serve in the interim until formal elections can be conducted in January 1974.

The interim officers are John Swearingen (DPMA), Chairman; Fred Harris (ACM), Vice-chairman; Paul Pair, (AEDS), Secretary; and William Eick (ACPA), Treasurer.

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Ifip Travel Grants Available

WASHINGTON, D.C. — The National Research Council Division of Mathematical Sciences has available several travel grants for attendance at the 1974 Congress of the International Federation for Information Processing (Ifip), Aug. 5-10, in Stockholm, Sweden.

An appointed committee will select grantees from the U.S.

The deadline for applications is Dec. 31. Applications may be obtained from the Math Division, National Research Council, 20418.

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CI Notes

16 Firms to Bid On Teale

CW West Coast Bureau

SACRAMENTO, Calif. — Sixteen firms have indicated they intend to submit proposals for the Stephen P. Teale Consolidated Computer Center.

The firms include:

Advanced Computer Typography, Inc.; Boeing Computer Services; Brandon Applied Systems, Inc.; Control Data Corp.; Cambridge Memories, Inc.; and Data 100 Corp.

Others are Four Phase Systems, Inc.; GTE Information Systems, Inc.; Harris Communications Systems, Inc.; Informatics, Inc.; IBM; Intel Corp.; Sanders Data Systems Inc.; Storage Technology Corp.; Telex Computer Products, Inc.; and Univac.

The companies will submit proposals for the entire job or for the separate categories of equipment, conversion and project management.

The last day for submitting proposals is Oct. 31.

CDC Sets Wagering Division

MINNEAPOLIS — Control Data Corp. has established the Automated Wagering Division to combine the company's resources for servicing the emerging automated wagering market.

CDC is developing software and systems in Australia and supporting an off-track betting operation in the State of Victoria there.

Boothe Finds Suitor

SAN FRANCISCO — National Computer Rental, Ltd., a member of the Flying Tiger Corp., has agreed in principle to acquire Boothe Computer Corp. for about \$4.3 million.

The transaction may involve a restructuring of Boothe's debt.

The agreement is contingent upon National Computer reaching agreement with Boothe's institutional lenders for the purchase by National Computer of about \$47 million of debt for about \$25 million.

Supershorts

International Computers Limited (ICL) is test-marketing its 2903 system in the New York Metropolitan area.

California Computer Products, Inc. and Informatica Nacional S.A. have signed an agreement under which Insa will sell and service Calcomp computer graphic systems in Mexico.

ADR International Corp. has added three sales representatives to market its software products: Singapore Computer Systems Ltd.; Bangkok Office System Supply Co., Ltd.; Thailand; and Equipos Cientificos y de Computacion, S.A., Mexico.

Problem Seen in Appeals Process

Basic Ruling in IBM-Telex Unchanged

By E. Drake Lundell Jr.
Of the CW Staff

TULSA, Okla. — Last week's confused legal action before Judge A. Sherman Christensen here did little to change the basic ruling he had issued in the IBM-Telex antitrust case a month earlier.

Instead, all of the sound and the fury last week strictly concerned the wording of the injunctive provisions against IBM and the amount of damages to be awarded to Telex because of IBM's monopolization of the plug-compatible peripherals market.

Late in the week Christensen rejected IBM's motion for a new trial on these issues and promised instead to consider them himself and reach a new decision on these issues within two or three weeks.

Originally the judge had planned to send the case to the Tenth Circuit Court of Appeals in Denver without the damage and injunctive provisions which would have been heard later.

Before Appeals Process

But after the week of legal maneuvering, he decided it would be better if the entire decision was handed down before the appeals process began — a solution most legal observers favored.

The basic issues and findings of the judge's original decision were generally unchallenged — even though each party promised to challenge them on appeal.

IBM still stands guilty of monopolization of the plug-compatible peripherals market and Telex is still guilty of the charge of misappropriating IBM trade secrets.

However, in his original decision, Christensen had not offset the competitive advantage gained by Telex through this misappropriation against the amount of damages he awarded to the firm.

This offsetting could substantially reduce the actual damages of \$117.5 million originally awarded to Telex.

The judge is currently considering this amount.

"There is no question the judge feels Telex was severely hurt by the IBM actions," one of the lawyers watching the

Analysis

case said, "and I feel he will award it a sizeable amount although it is clear that it will be less than the \$117.5 million in his previous decision."

But even if that amount were cut in half to take into account the Telex theft of trade secrets, another source noted, that would leave Telex with actual damages of around \$60 million, which, after trebling as provided in the Sherman Antitrust Act, would amount to an award of \$180 mil-

CDC, Soviets Sign 10-Year R&D Pact, Manufacturing Possible

By a CW Staff Writer

WASHINGTON, D.C. — The first major contract between a U.S. computer manufacturer and the Soviet Union was signed last week between Control Data Corp. and the Soviet State Committee for Science and Technology.

Although all of the details of the 10-year research and development contract still must be worked out, some sources estimated the pact will be worth \$500 million over that period of time.

The contract could also lead to some component manufacturing activity on the part of CDC in the Soviet Union, and could call for Control Data aid in establishing a Soviet equivalent of a national time-sharing network, sources said.

Under the terms of the basic contract, joint study teams made up of Control Data personnel and Soviet technicians will develop designs for computer mainframes and peripherals, sources said.

In addition, the contract calls for joint research in the areas of data processing and communications systems and for software development work on such systems, particularly in the areas of medi-

cine, education and transportation.

While the present pact does not call for any manufacturing in the Soviet Union on the part of Control Data, Tass, the Soviet press agency, last week quoted D.M. Gvishiani, deputy chairman of the Committee for Science and Technology, as saying that talks were already under way in this area between the two groups.

Gvishiani, according to Tass, said the talks involved the possible construction of both component manufacturing facilities and actual computer manufacturing plants within the Soviet Union by Control Data on a "compensation basis."

Under this type of arrangement, CDC would be paid for the construction of the plants through the output from them after they were in operation.

Soviet officials are reportedly hopeful that the CDC experience with the Cybernet service could lead to research for such a time-sharing network in the Soviet Union.

The present contract, however, is vague on this point, and calls only for the development of software that could be used in such systems.

IBMer Wins Nobel Prize

ARMONK, N.Y. — Leo Esaki of IBM has been awarded the 1973 Nobel Prize for physics. He shares the prize with Brian Josephson of Cambridge University and Ivar Giaever of General Electric.

Esaki, a Japanese citizen, received the award for his early work on the tunneling process of electrons. This research was done during the early 1950s.

An IBM Fellow, Esaki joined the company in 1960 and is currently working at the Thomas J. Watson Research Center in a project on superlattices of semiconductors.

lion against IBM.

The current betting on the reduced amount runs to the 50% figure, even though several people have indicated it could be cut less.

If the judge, for example, reduces the award by the amount of the counterclaim, \$21.9 million, Telex would be allotted an award of \$95.4 million before the damages are trebled, sources noted.

Both sides submitted to the judge their proposals for the wording of injunctive relief that would meet his goal of reducing the power of IBM in the plug-compatible market.

He now will take those proposals under advisement and try to come up with compromises where necessary.

Appeals Process Problem

The real problem with the confusing week, and Christensen's seeming indecision on some of the matters relating to the damages part of the judgment, may come with the appeals process, several lawyers said last week.

The indecision and apparent changes in the decision might possibly give IBM an argument that the whole case was tainted and therefore should be remanded for a new trial, they indicated, even though they said such an action was remote.

IBM itself reacted cautiously to the week of activity, proclaiming that "we hope we have made significant progress regarding the damages and injunctive relief. More importantly, we can now look forward to a speedy appeal of the case to the appeals court, where we can resolve the case on the merits."

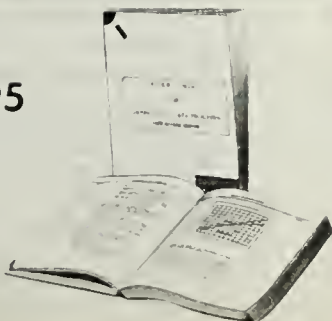
And the appeal is likely to be fast. The Tenth Circuit Court of Appeals is known to be one of the fastest in the country on hearing appeals from lower court decisions, and the case here is expected to be expedited even faster than normal.

Lawyers for IBM indicated the appeals court may be able to rule within six months of the decision from Christensen, expected within two or three weeks.

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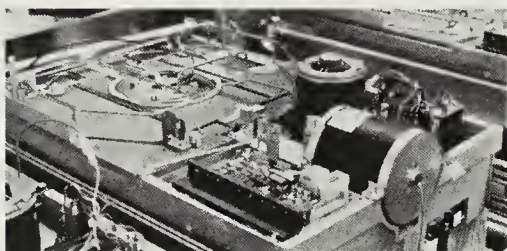
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Caelus employee assembles CD 22 disk drives.



Caelus 203 Series front-loading disk drive.

Caelus Plans 3336-11-Type Disk, Will 'Wait and See' on Winchester

By Molly Upton
Of the CW Staff

SAN JOSE, Calif. — Caelus Memories expects to offer a disk compatible with the double-density IBM 3336-11 in the latter part of 1974, according to Jim Moreton, vice-president and assistant general manager.

The firm is also looking at the Winchester disk design. Although Moreton questions whether the consumer will be getting real value for his money on the Winchester drive, Caelus is a media supplier and "if that's the way disks go, we'll stay abreast," he said. But for now, the firm will "wait and see."

For every Winchester disk, he explained, the user will essentially be paying for heads, a portion of the positioner, the plastic container and a portion of the drive.

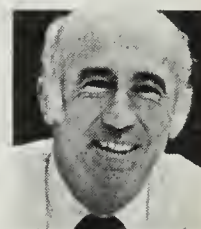
Since Caelus manufactures disk drives as well as the disks, the firm has the "blending of the disciplines" necessary to under-

take such a product, he said during a recent interview.

The hardware for the floppy disk "is an exciting market," he observed, and very interesting, but the disk itself currently is "a lower priority item."

Caelus sells its disks to the end-user market through distributors, and does a large volume through OEM accounts.

The firm's engineers, Moreton explained, often work with an OEM on the development of its drive and its media requirements. "It's the old chicken and egg principle," he added.



Moreton

Caelus makes disk packs for the Univac 8440, which are the largest capacity removable disk packs being delivered, he said. The units have a 20% larger capacity than the IBM 3336, he said, and no 3336-11s have been delivered to customers.

In 1969 Caelus brought out the 2315-compatible cartridge with a density of 2,200 bit/in., using 2314 technology. The IBM unit, he noted, has a lower density.

Ultimately, the firm might create a new cartridge with almost the capacity of the 2314, he said.

In terms of disk shipments, the cartridge leads in product popularity, followed by the 3336-compatible units, then the 2316-type disks, Moreton said.

Most of the disk revenue, however, stems from the 3336-type unit.

Quality control plays an important part in product reliability, and the firm is structured with areas reporting directly to the general manager.

The firm designed and built several of the units used to test disks in the various stages of manufacture.

But customer information and service is also important. For instance, Caelus discovered that when certain programs such as one for error correction are run on a 370 using a 3336 disk, a special disk is needed, Moreton said.

In addition, the customer needs to be informed on the proper handling and care of disk packs, he said.

Virtual memory is a boon to rotary memories, he said, explaining that the virtual user needs good disk packs.

The firm OEMs its disk drives, which range from the Model 103, a 3M-bit fixed disk, to the Models 206 and 306, front and top loading 12M-bit disks with 200 track/in. density.

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Contracts

Computel Systems Ltd. has been awarded a contract by the Royal Trust Co. to provide computing services other than systems design, programming and data control functions which will be retained by Royal Trust.

Systems Engineering Corp. has been awarded a contract to provide data processing services to its parent firm Richmond Corp. and all company affiliates.

MRI Systems Corp. has received a contract from the U.S. Department of Agriculture for the lease of System 2000, a data management system.

Intertel has been awarded a data communications equipment contract by American Airlines. The contract includes Intertel MCS2400 modems to support Sabre reservation terminals, and the MPT500 Multipoint Test System.

Unitech Inc. has received a contract from the Electronic Systems Division of the Air Force Systems Command to provide the computer capability necessary to assist in the operation of the Solar Observing Optical Network (SOON).

Government Is Canada's Largest User

By T. Whiteman

Special to Computerworld

OTTAWA, Ontario — The cost of computer services to all departments of the Federal Government of Canada for the 1972-73 period is estimated at about \$100 million, C. M. Drury disclosed to the House of Commons.

This figure includes equipment, personnel and all other direct costs. Computer service cost elements have not been reported separately by departments

and are only estimates, he said.

A recently approved DP master plan is expected to produce improved financial reporting that will give visibility of computer service costs related to the various government department programs.

About one half of all government departments operate their own computers, with the remainder obtaining the bulk of computer services from some 65 firms in the private sector, said Drury, Treasury Board president.

The government, he noted, has no intention of centralizing all computer services under the jurisdiction of the Federal Department of Supply and Services.

Plans are being developed to coordinate generally government-wide computer services in the areas of personnel management information systems, inventory and warehouse management systems, financial management information systems and text processing.

Statistics indicate the Federal Government of Canada is the largest computer user in Canada. The Federal Government operates over 250 installed computers with an annual DP budget of about \$81 million which is expected to grow to \$174 million by 1975.

Selling Me a CPU? Try These Tips...

By H.B. Taylor

Special to Computerworld

NEWTON, Mass. — When I was assigned to investigate procuring a computer, salesmen came and gave their sales pitch. Their approach was awful. I didn't buy.

This article is designed to give insight to people who must deal with laymen like myself.

Why didn't I buy? Not one salesman was able to alter his approach so that we could effectively communicate.

Here are some "do's and don'ts" which would have made the difference in selling to me:

Talk in my language. I haven't been to school to learn computer language. Don't try to dazzle me with references to milliseconds and storage capacity in the zillions of characters. It takes Helen an hour to recap the sales for one department each day. *That* is my standard for speed.

One other thing; don't talk down to me. I may not know your product, but I know a lot more about *my* situation than you do, Mister! Care to swap bosses for a month?

Give me an overview first. My concern is how I get data into the computer and what the computer gives me back. At this point I am not interested in the circuitry and the wheels that whirl and hum.

Tell me about practical problems I will encounter. Common sense tells me a major changeover like this will present some problems. Let's talk about them.

What about paper flow, running a parallel system, training, equipment breakdowns? How do I check the accuracy of the information received back from the computer?

Tell me what I get back from the computer in detail. My office has to generate numerous monthly reports. Can you give these to me? What form do the printouts take?

Know enough about my operation to talk in meaningful terms. You put in a similar system at the Midnight Auto Parts Store last month? Good for you! I don't sell parts; I sell clothing.

What about markdowns, employee discounts, leased department sales? Retail accounting is a strange animal. Do you know the basics?

Give me a ballpark idea of the cost dollars. That means all of the cost dollars, hardware, software, programming, people, training. I'm making a study on the feasibility of your system for my company.

What do I have to pay keypunch operators in this town? What will it cost to make your system work, start to finish? I already know what it costs me right now on a manual system.

Reassure me your people will work with me. I am afraid of jumping in and having you step back out of the battle. Just what do you do to help me get this system working? And how long can I count on your people to help? When the equipment fails, how long does it take to get a repairman over here?

These are some things I want to know. Convince me your company can produce along these lines and you've got a sale!

One last thing: make an appointment before coming over. I've got a job to do, too.

H.B. Taylor is a freelance writer and a former controller of a major apparel company.

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Superior Human Engineering—Each CO:77 operator is provided with a moveable keyboard and separate desk-top display that pivots on its base for convenient viewing and improved operator efficiency. Other characteristics which make usage far easier are the light weight of the terminal, important in moving it from place to place; provisions for adjusting the screen to ambient light conditions, another "human engineering" feature exclusively from Computer Optics; dual case character set with 16 x 18 matrix;

ten key numeric pad; up to 9600 bps transmission rate; large cursor with reverse image; full range of display sizes: 960, 480 or 1920 characters; n-key rollover vs. IBM's two-key rollover.

Computer Optics: the company itself—Computer Optics has been selling information display systems since 1968. It is the organization that puts its *first* emphasis on expanding the state of the art in computer peripherals technology. This kind of venturesome thinking created the CO:77 Information Display System. And Computer Optics is pressing forward with work on ahead-of-the-art computer developments for the years immediately ahead.

Write to us for full information and specifications on the CO:77, the IBM 3270 replacement.



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Orders for NCR's 775 Double Projections, Total \$25 Million

DAYTON, Ohio — Orders for NCR's 775 proof and encoding system are more than double the company's projections.

Orders to date, 90 days after the system's unveiling, total more than \$25 million, according to William F. Walsh, vice-president, financial marketing.

Orders & Installations

The orders, from more than 600 commercial banks across the country, represent 2,425 individual units.

One of the major incentives for installing electronic proof equipment is the ability, through programming, to handle credit card billing, lock-box accounting and loan-coupon encoding, as well as proof operations, Walsh said.

Other Orders, Installations

Big V Shop-Rite Supermarkets, located in Florida and New York, has ordered 10 electronic checkout systems from the Electronic Store Information System Division of Bunker Ramo Corp.

The Illinois Secretary of State's office has ordered a Model 6080 computer from Honeywell for a variety of applications including auto registrations, the state library, and administrative functions.

The University of Kansas at Lawrence has installed 13 NCR 280 retail terminals in its bookstore for recording sales and maintaining inventories.

The town of Corte Madera, Calif., has installed a Philips Magnetic Ledger Electronic Accounting System.

The A&P Supermarket chain has ordered 2,000 electronic portable field data entry terminals from MSI Data Corp., for use in a nationwide electronic store ordering and inventory control system.

Lincoln Income Life Insurance Co. has ordered a Univac 9700 computer system for use in life, group and industrial insurance processing.

Northwestern National Bank of Minneapolis has installed a PSS (Profit Sharing System) from Trilog Associates for processing the participant accounting needs of employee benefit trusts.

Marquette University has installed a Xerox Sigma 9 to upgrade the university's computer facilities.

Dewberry, Nealon & Davis, a firm of architects, engineers and surveyors, has installed a Digital Scientific Meta 4/1800 Emulator Computer System, replacing an IBM 1800 computer.

I was a
9-bit
weakling.



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Minicomputers. Where they're at, how they got there, and what they may be doing tomorrow. That's what our *November 28th Minicomputer Supplement* will be looking at. Stories from current miniusers, review, analysis, projections. It'll all be there on November 28th. And if you're marketing in this area, your ad should be there, too. Closing date is November 9th, and you can get all the details from your *Computerworld* representative, or write to Judy Milford, *Computerworld*, 797 Washington Street, Newton, MA 02160. (617) 965-5800.

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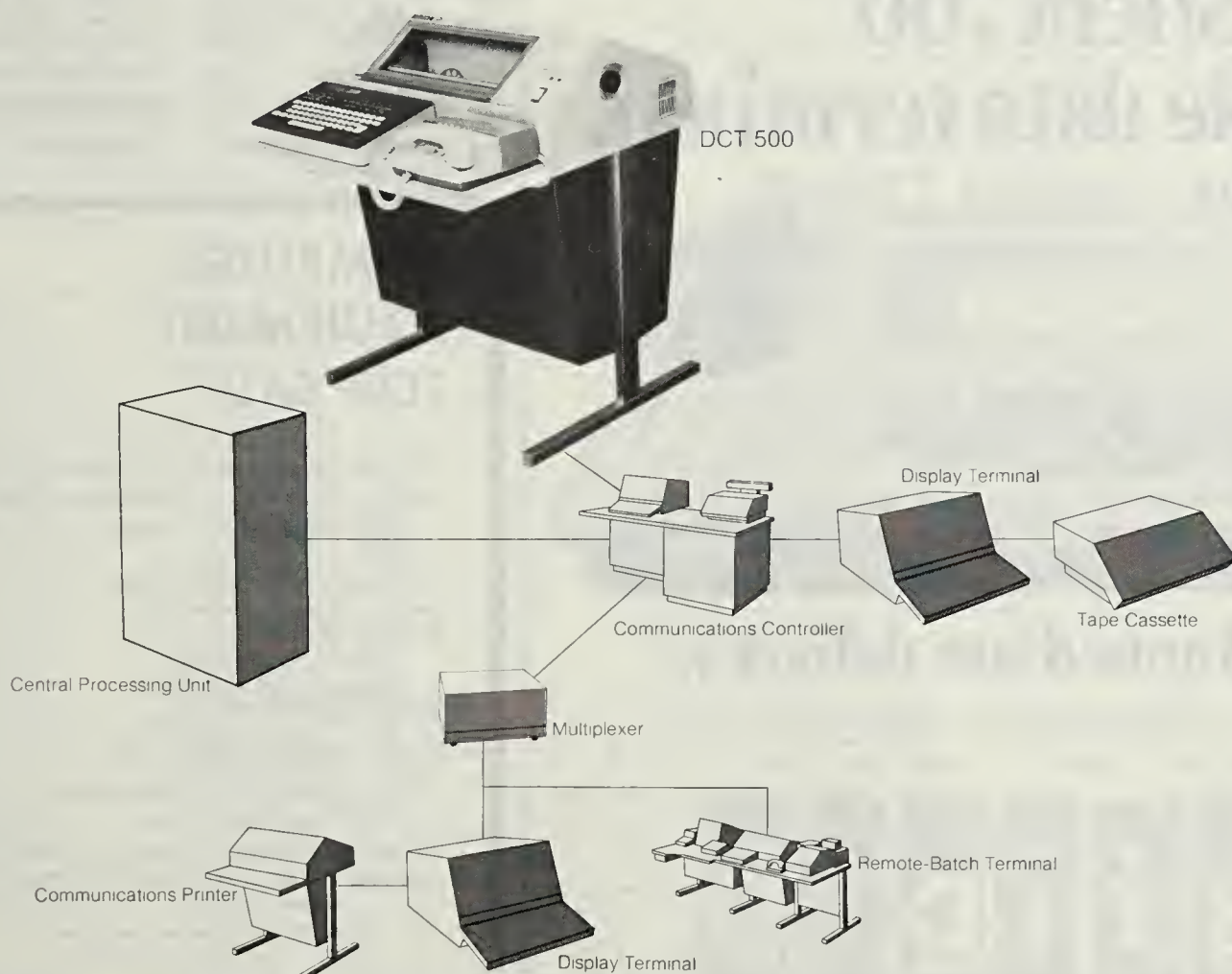
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New Firm to Spread APL in Europe

BRUSSELS, Belgium — I.P. Sharp Associates Ltd. of Toronto, Canada, and Sligos of Paris, France, have jointly formed a new company to be known as APL Europa.

APL Europa is designed to make available a body of APL expertise to various operating companies scheduled to be set up throughout Europe by Sligos and I.P. Sharp Associates.

Through the company, the full

scope of the APL interactive time-sharing system, associated libraries and data bases will be available through a European network on a local dial-up basis.

Current APL applications include scientific and technical applications; circuit, statistical and financial analysis; creation, accessing and manipulation of data bases; modeling and simulation; corporate planning; and management information systems.

Data 100 to Get Circuit Science

MINNEAPOLIS — Data 100 Corp. has announced plans to acquire Circuit Science, Inc. in exchange for Data 100 common stock, with a current market value of approximately \$3 million.

The acquisition will be handled as a tax-free exchange and will be accounted for on a pooling-of-interest basis.

Under the terms of the agreement, Circuit Science will provide Data 100 with part of the printed circuit boards the company requires for its computer equipment products.

Data 100 will, however, continue to rely on independent suppliers for a significant portion of its printed circuit board needs, according to Edward D. Orenstein, president of Data 100.

Circuit Science "will continue to expand its present independent printed circuit board activities," Orenstein added.

AUC Acquires XLO Line

BOSTON — American Used Computer Corp. (AUC) has purchased the remote job entry (RJE) equipment inventory and leases of XLO RJE intelligent terminals.

AUC will continue to support the XLO customers with maintenance service provided by Sirvess, and there will be no inter-

ruption in this service as a result of the transaction, according to Adolf F. Monosson, AUC president.

XLO manufactured an 8-bit microprogrammed minicomputer — the XLO 3100 — packaged into an RJE terminal — the XLO 7700.

Acquisitions

The acquired inventory includes a substantial number of minicomputers and high-speed line printers, as well as card readers, card punches, paper tape readers and an inventory of spare parts.

Other Acquisitions

Chatsworth Data Corp. has acquired all rights to Automata Corp.'s Source Data Optical Mark Readers, Educational Data Terminal Systems and Source Data Communication Systems. Chatsworth has also acquired Accurate Electronics' Cable-master Product line.

United Aircraft Corp. has agreed in principle to acquire Terminal Communications as a wholly owned subsidiary.

Computer Machinery Corp. has acquired Cipher Data Products, Inc., for 228,000 shares of CMC common stock.

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- 2 — DEC Tape Units with Drives
- 3 — Teletype ASR 33 Terminals
- 1 — Vogue 400C Line Printer
- 2 — Memorex P240 Terminals
- 2 — Memorex 630 Disc Drives
- 1 — Telefile DC-16 Disc Controller
- 2 — Vista ONE VDU Terminals
- 1 — Data Dynamics 2011 Card Reader
- 1 — Repco Electrostatic Printer

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Board to Manage Inforex Affairs

BURLINGTON, Mass. — Inforex, Inc. has turned to management by committee, with the resignation of Thomas B. Morgan as president and chief executive officer. He will remain a director and member of the executive committee.

Running day-to-day operations will be vice-presidents J. Robert Taylor and Fritz Kern, who will report to the four-man executive committee.

Taylor was named manager of domestic operations. Kern manages European operations. The management realignment "isn't an interim thing," a spokesman said.

On the financial side, Inforex Leasing Co. II has extended its purchase commitments to Dec. 31, 1973, from Sept. 30 and is committed to purchase up to \$2.5 million worth of Model 1302 systems in the calendar quarter.

In consideration of the new purchase commitment, Inforex issued five-year warrants to purchase up to 25,000 shares of common of the company.

O'Kelley on CIA Board

SAN ANTONIO — Harold E. O'Kelley, president of Datapoint Corp., has been elected to the board of directors of the Computer Industry Association.

Executive Corner

Other Moves

■ A. Michael O'Reilly has been promoted to president of the Rand Teleprocessing Division of Brandon Applied Systems, Inc. Gerald M. Svardloff and Roderick Clayton were named vice-presidents.

■ Harry L. Crumacker has been elected president and chief executive officer of SCS Corp., manufacturer of remote batch terminals.

■ James W. Halverson, formerly vice-president, finance, has been elected president and chief executive officer of Intranet Computing Corp.

■ J. David Hann has been named president of Courier Terminal Systems, Inc., a subsidiary of Boothe Computer Corp. Hann was formerly senior vice-president of operations.

■ Theodore F. Shaker, president of Control Data Corp.'s American Research Bureau, has been appointed a vice-president of CDC's Systems and Services Co.

Publication Pinpoints RCA Former Employees

PALATINE, Ill. — Ever wonder what happened to the 25,000 people who worked at one time for RCA's Computer Division? Well, your wondering days are over.

The first edition of the RCA Computer Alumni Locator is scheduled to appear this fall, two years after the division was dissolved.

Some 6,000 names and current locations of alumni have already been gathered, and any alumnus wishing to be included can do so by sending his or her business card to Box 844, 60067, before the publication goes to press in November.

POSITION ANNOUNCEMENTS

PROGRAMMER ANALYST

Immediate opening available for a qualified Programmer Analyst in a St. Louis based division of an international corporation presently converting to a Burroughs 2700 computer system.

Position calls for designing and programming computerized systems and assisting in our conversion effort. Requires a degree in business administration and at least 3 years COBOL experience; manufacturing systems experience; experience with Burroughs computers and a knowledge of RPG.

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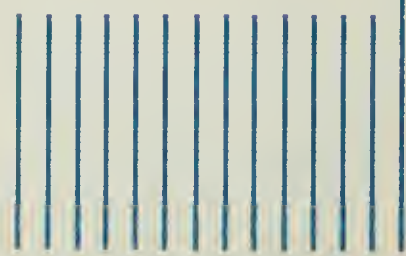
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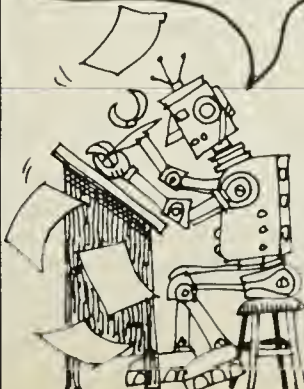
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NCR Smiles at Nine-Month Figures

NEW YORK — National Cash Register Co. reported record earnings and revenues in the third quarter and nine months. Recent cost-saving programs,

including substantial employment reductions; strong overseas results; and the continuing improvement of its computer business were cited by President

William S. Anderson as factors in the improved earnings picture.

In the third quarter, earnings rose to \$16.5 million or 70 cents a share compared with \$5.7 million or 25 cents a share in the same year-ago period. Revenues rose to \$438 million from \$389.7 million.

The nine-month results also improved, with earnings of \$37.3 million or \$1.60 a share compared with \$3.6 million or 15 cents a share.

Revenues rose to \$1.24 billion from \$1.10 billion in the 1972 period.

The 1972 results have been restated to reflect some accounting changes. At the end of 1972 NCR changed from a last-in, first-out inventory valuation basis to the first-in, first-out method and to the straight line method of depreciating plant, manufacturing and rental equipment, a spokesman said.

As originally stated, nine-month earnings for 1972 were \$396,000, and \$4.4 million for the quarter.

NCR Japan and NCR United Kingdom led the international subsidiaries in gains, the firm said.

NCR also recorded increased earnings from the sale of business forms and supplies and from its data center operations and technical services.

NCR plans to make a \$1 million equity investment in Applied Digital Data Systems, Inc., maker of CRT terminals.

The transaction will involve purchase by NCR of 266,667 shares of Adds common.

Data Products Results Set Record For 6 Months; Earnings Quadruple

WOODLAND HILLS, Calif. — Data Products Corp. revealed record results from operations for the six-month period ended Sept. 29.

Earnings increased more than fourfold over the first six months of last year. Earnings, including tax credit and profit from repurchased debentures,

rose to \$3.6 million or 52 cents a share from \$757,000 or 11 cents a share last year.

The 1973 figure includes \$1.6 million in special credit from tax-loss carryforward, while in 1972 the figure was \$325,000.

Revenues reached an all-time high of \$36.1 million, an increase of 31% over the \$27.5 million recorded in the year-ago period.

"Backlog rose to \$37.2 million, up 43% from the same time last year," President Graham Tyson stated. "The backlog includes only the fixed scheduled portions of our orders. The unscheduled portion of our long-term contracts is larger than the reported backlog."

All sectors of the business performed well and showed growth except for the Telecommunications Division, where the government business has not yet reached expectations, he said.

Especially encouraging has been the worldwide broadening of the customer base during the past few months and the long-term nature of the contracts recently booked, according to Tyson.

Data Products' fiscal position is strong and corporate debt has been further reduced, he said.

National CSS Has Good News

NORWALK, Conn. — National CSS, Inc.'s earnings and revenues increased in both the quarter and six months ended Aug. 31.

Quarterly revenues rose to \$5.7 million from \$4 million a year ago, while earnings climbed to \$430,395 or 40 cents a share from \$349,857 or 32 cents a share in the same 1972 period.

In 1973, a special credit of \$52,200 was included, while the figure in 1972 was \$177,388.

In the six months, earnings jumped to \$817,679 or 75 cents a share from \$631,321 or 58 cents a share in the year-ago period. Income before special credit more than doubled, from \$325,330 to \$713,279.

Revenues climbed to \$10.9 million from \$7.8 million.

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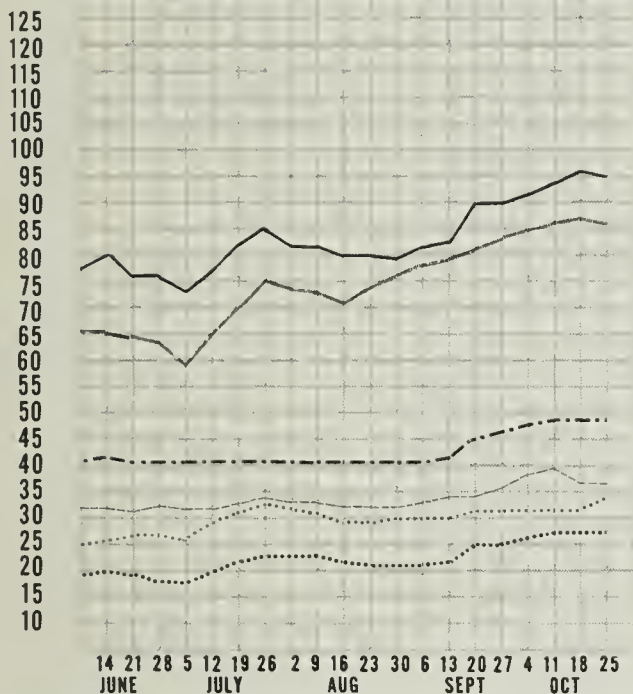
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Earnings Reports

ELECTRONIC ASSISTANCE Six Months Ended July 31				XEROX Three Months Ended Sept. 30				COLLINS RADIO Year Ended Aug. 3			
1973	1972			1973	1972			1973	1972		
(000)	(000)			(000)	(000)			(000)	(000)		
Revenue	\$17,879	\$17,961		Revenue	\$97	\$80		Revenue	\$350,273	\$250,416	
Spec Cred	.....	15		Revenue	762,544	604,981		Tax Cred	5,663	.....
Loss	117	300		Earnings	76,959	63,046		Earnings	12,811	(63,846)	
				9 Mo Shr	2.82	2.33		3 Mo Rev	99,161	76,078	
a-Restated to exclude sales from dis-				Revenue	2,183,693	1,766,046		Tax Cred	2,414	.....
continued operations.				Earnings	223,307	183,536		Earnings	6,041	(4,056)	
COMPUTER EXCHANGE Year Ended June 30				COMPUTER DATABANKS Six Months Ended June 30				NATIONAL CSS Three Months Ended Aug. 31			
1973	1972			1973	1972			1973	1972		
(000)	(000)			(000)	(000)			(000)	(000)		
Shr Ernd	\$14	\$(1.16)		Shr Ernd	\$11	\$05		Shr Ernd	\$40	\$32	
Revenue	7,013,466	3,597,498		Revenue	757,058	566,577		Revenue	5,653,790	4,018,425	
Earnings	119,930	(1,018,230)		Earnings	43,353	19,147		Tax Cred	52,200	177,388	
								Earnings	430,395	349,857	
								6 Mo Shr	.75	.58	
								Revenue	10,934,158	7,801,698	
								Tax Cred	104,400	305,991	
								Earnings	817,679	631,321	

COMPUTERWORLD Computer Stocks Trading Indexes

Computer Systems Software & EDP Services
Peripherals & Subsystems Leasing Companies
Supplies & Accessories CW Composite Index



DECISION DATA COMPUTER Three Months Ended Sept. 1			
1973	1972		
(000)	(000)		
Revenue	\$4,907,841	\$999,324	
Loss	245,005	775,790	
9 Mo Rev	12,211,311	1,437,978	
Loss	926,743	1,952,614	

WILTEK Three Months Ended July 31			
1973	1972		
(000)	(000)		
Shr Ernd	\$06	\$04	
Revenue	3,647,000	1,525,000	
Earnings	85,000	57,000	
9 Mo Shr	.13	.20	
Revenue	8,375,000	4,237,000	
Spec Item	(2,000)	20,000	
Earnings	184,000	280,000	

GENERAL AUTOMATION Year Ended Aug. 3			
1973	1972		
(000)	(000)		
Shr Ernd	\$1.20	\$0.81	
Revenue	30,381,522	16,028,994	
Tax Cred	500,000	649,270	
Earnings	2,781,539	1,567,534	

APECO Three Months Ended Aug. 31			
1973	1972		
(000)	(000)		
Shr Ernd	.....	\$03	
Revenue	\$35,283,714	29,946,056	
Spec Chg	.....	a400,000	
Earnings	(479,048)	307,009	
9 Mo Shr	.12	.30	
Revenue	105,057,493	90,430,155	
Spec Chg	.....	a400,000	
Earnings	1,295,622	3,002,790	

a-Loss resulting from flood damage to Pennsylvania mobile home facilities.

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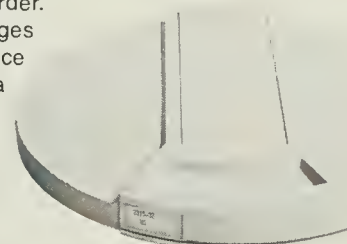
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Computerworld Stock Trading Summary

All statistics compiled, computed and formatted by
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PRICE						PRICE						PRICE																
1973		CLOSE	WEEK	WEEK		1973		CLOSE	WEEK	WEEK		1973		CLOSE	WEEK	WEEK												
RANGE		OCT 25	NET	PCT		RANGE		OCT 25	NET	PCT		RANGE		OCT 25	NET	PCT												
(1)		1973	CHNGE	CHNGE		(1)		1973	CHNGE	CHNGE		(1)		1973	CHNGE	CHNGE												
COMPUTER SYSTEMS																												
N	RUPPOUGHS CORP	211-245	240	+A	+3.4	O	ADVANCED COMP TECH	1- 2	2 1/4	0	0.0	X	COMPUTER COMMUN.	1- 4	1	+ 1/8	+14.2											
N	COLLINS RADIO	16- 26	24 3/4	+ 1/8	+0.5	A	APPLIFO DATA RES.	2- 4	3	+ 5/8	+26.3	A	COMPUTER EQUIPMENT	2- 3	2	+ 3/8	-15.7											
O	COMPUTER AUTOMATION	5- 20	18 1/2	-1 3/4	-8.6	O	APPLIED LOGIC	1- 3	1 1/2	-1/8	-20.0	O	COMPUTER MACHINERY	5- 13	6 7/8	- 1/8	-1.7											
N	CONTROL DATA CORP	31- 62	47 3/4	+1	+2.1	N	AUTOMATIC DATA PROC	39- 94	67 1/2	-4	-5.5	N	COMPUTER TRANSCIVER	1- 6	1 3/8	- 1/8	-8.3											
O	DATA GENERAL CORP	28- 49	44 1/2	-2	-4.3	O	BRANSON APPLIED SYST	1- 1	1 1/4	0	0.0	N	CONRAC CORP	15- 32	20 1/4	- 1/2	-2.4											
O	DATAPoint CORP	10- 21	19 1/4	+ 1/4	+1.3	O	CENTRAL DATA SYSTEMS	6- 9	6 3/4	0	0.0	O	DATA ACCESS SYSTEMS	1- 3	2	0	0.0											
O	DIGITAL COMP CONTROL	2- 6	3 1/4	+ 1/4	+8.3	O	COMPUTER DIMENSIONS	2- 5	3 3/4	0	0.0	O	DATA 100	9- 19	16 3/4	- 1/4	-1.4											
N	DIGITAL EQUIPMENT	73-111	111	+5	+6.7	O	COMPUTER DYNAMICS	1- 2	1 1/2	0	0.0	A	DATA PRODUCTS COMP	2- 5	4 1/2	- 3/8	-7.6											
N	ELECTRONIC ASSOC.	4- 9	4 1/4	-1 1/2	-26.0	O	COMPUTER HORIZONS	1- 6	2 1/2	-1/4	-9.0	O	DATA RECOGNITION	2- 3	1 1/2	0	0.0											
A	ELECTRONIC ENGINEER.	6- 14	12 1/4	- 3/4	-5.7	O	COMPUTER NETWORK	1- 5	1 1/4	0	0.0	O	DATA TECHNOLOGY	2- 5	2	0	0.0											
N	FOXBORO	23- 46	45 5/8	+1	+2.2	N	COMPUTER SCIENCES	2- 6	3 1/4	+ 1/8	+4.0	O	DECISION DATA COMPUT	8- 40	12 5/8	- 1/8	-0.9											
O	GENERAL AUTOMATION	22- 55	42 1/2	0	0.0	O	COMPUTER TASK GROUP	1- 2	1 1/8	-3/8	-25.0	O	DELTA DATA SYSTEMS	1- 1	3/4	+ 3/8	+100.0											
O	GPI COMPUTER CORP	1- 3	1 5/8	+ 1/8	+8.3	O	COMPUTER TECHNOLOGY	1- 3	1	0	0.0	O	DIAN CONTROLS	1- 4	2 3/4	0	0.0											
N	HEWLETT-PACKARD CO	73- 98	95 7/8	+1	+1.0	O	COMPUTER USAGE	4- 9	4 3/4	-3/8	-7.3	N	ELECTRONIC M & M	3- 6	5 3/8	- 1/8	-2.2											
N	HONEYWELL INC	98-139	108 7/8	-1 3/8	-1.2	O	COMRESS	1- 2	3/8	0	0.0	O	FARRI-TEK	2- 5	3 1/2	+ 1/8	+3.7											
N	IBM	249-340	287 1/2	+4 1/4	+1.5	O	CONSHARE	4- 9	4 3/8	+ 1/8	+2.9	O	GENERAL COMPUTER SYS	5- 9	5 3/4	- 1/2	-8.0											
O	INTERDATA INC	7- 14	13	-1	-13.7	N	CONCORDIA CORP	4- 15	4 5/8	0	0.0	N	GENERAL ELECTRIC	56- 76	67 1/2	+2	+3.0											
O	MICRONATA CORR	2- 10	4 1/8	+ 1/2	+13.7	O	CYBERMATICS INC	1- 3	1 5/8	-1/8	-7.1	N	HAZELTINE CORP	5- 9	7 1/4	- 1/2	-6.4											
N	NCP	27- 45	44 1/2	+ 1/8	+0.2	O	DATATAB	1- 4	1 1/4	-1/8	-9.0	O	INFOPEX INC	5- 23	5 3/4	0	0.0											
N	RAYTHEON CO	22- 34	33 1/2	+1 7/8	+5.9	A	ELECT COMP PROD	1- 2	1	0	0.0	O	INFORMATION DISPLAYS	1- 2	3/8	0	0.0											
N	SINGEF CO	45- 74	55	-1 1/2	-2.6	N	ELECTRONIC DATA SYS.	29- 56	33 1/8	-3 5/8	-9.8	O	INFORMATION INTL INC	10- 15	12 1/4	+ 1/4	+2.0											
N	SPERRY RAND	36- 54	52 1/2	- 3/8	-0.7	O	INFORMATIONAL INC	1- 2	1 1/2	0	0.0	A	LUNOY ELECTRONICS	3- 9	3 3/4	- 1/8	-3.2											
A	SYSTEMS ENG. LABS	3- 8	3	- 1/8	-4.0	O	INFORMATICS	2- 6	5 5/8	+ 1/4	+4.6	N	MANAGEMENT ASSIST	1- 1	3/8	0	0.0											
N	TEXAS INSTRUMENTS	83-138	133 1/2	+3 1/4	+2.4	O	I.O.A. DATA CORP	1- 1	1 1/4	0	0.0	N	MEMOREX	2- 19	4 1/8	+ 1/8	+3.1											
O	ULTIMACC SYSTEMS INC	1- 11	2	- 1/8	-5.8	O	IPS COMPUTER MARKET.	1- 5	1 7/8	0	0.0	A	MILGO ELECTRONICS	14- 28	24 1/8	-1	-3.9											
N	VARIAN ASSOCIATES	10- 20	16	0	0.0	O	KEANE ASSOCIATES	3- 5	4	+ 1/4	+6.6	O	MOHAWK DATA SCI	4- 13	5	- 1/8	-2.4											
N	WANG LABS.	13- 34	28 3/4	-2 3/8	-7.6	O	KFYOTA CORP	6- 12	6	+ 1/8	+2.1	O	OPEC COMPUTER SYST.	2- 6	4 1/8	0	0.0											
N	XEROX CORP	138-169	145 1/2	+1	+0.6	O	KEYDATA CORP	6- 12	6	+ 1/8	+2.1	O	OPTICAL SCANNING	2- 8	4 1/2	0	0.0											
LEASING COMPANIES																												
A	BOOTHF COMPUTER	0- 0	1 1/8	0	0.0	O	LOGICON	3- 7	3 3/8	-1/8	-3.5	A	ORTEC CORP	4- 8	6 1/4	- 3/8	-5.6											
O	BRESNAHAN COMP.	1- 2	2 1/8	0	0.0	A	MANAGEMENT DATA	2- 5	2 1/8	0	0.0	N	PHOTON	3- 7	3 3/4	0	0.0											
O	COMDISCO INC	6- 17	8	- 1/4	-3.0	O	NATIONAL CSS INC	18- 42	32	+ 1/2	+1.5	A	POTTER INSTRUMENT	3- 9	5 1/4	- 1/2	-8.6											
O	COMMERCE GROUP CORP	3- 4	3 1/2	- 1/8	-3.4	O	NATIONAL COMPUTER CO	1- 1	3/8	0	0.0	O	PRECISION INST.	2- 6	3 3/4	- 3/4	-16.6											
O	COMPUTER EXCHANGE	1- 1	1/2	+ 1/4	+10.0	O	NATIONAL INFO SVCS	1- 2	3/8	0	0.0	O	QUANTON CORP	5- 10	5 1/4	0	0.0											
A	COMPUTER INVSTRS GRP	2- 8	3 7/8	+ 5/8	+19.2	P	ONLINE SYSTEMS INC	12- 23	25	+2 3/4	+12.3	A	RECOGNITION EQUIP	4- 8	5 1/4	+ 7/8	+20.0											
O	COMP. INSTALLATIONS	1- 2	1	0	0.0	N	PLANNING RESEARCH	2- 7	3 3/4	+ 1/4	+7.1	N	SANOERS ASSOCIATES	7- 18	11 3/8	- 1/8	-1.0											
M	DATRONIC RENTAL	2- 3	2	0	0.0	O	PROGRAMMING METHODS	21- 25	21	0	0.0	O	SCAN DATA	1- 6	3 3/8	+ 1/8	+3.8											
A	OCL INC	1- 3	7/8	+ 1/8	+16.6	O	PROGRAMMING & SYS	1- 1	5/8	0	0.0	O	STORAGE TECHNOLOGY	11- 34	21 1/2	-1 7/8	-8.0											
A	DEARBORN-STORM	12- 26	18 3/4	+2 1/8	+12.7	O	RAPIDATA INC	5- 24	4 5/8	-3/8	-7.5	O	SYCOR INC	9- 20	17 1/2	-1	-5.4											
N	OPF INC	5- 9	4 3/4	- 3/8	-7.3	O	SCIENTIFIC COMPUTERS	1- 3	3/4	0	0.0	O	TALLY CORP.	2- 14	4 1/4	+ 1/4	+6.2											
O	EDP RESOURCES	1- 3	1 3/8	+ 1/8	+10.0	O	SIMPLICITY COMPUTER	1- 4	1 1/2	+ 1/4	+20.0	N	TFC INC	6- 9	7 3/4	0	0.0											
O	GRANITE MGT	2- 6	3 3/4	- 1/8	-3.2	O	TAS COMPUTER CENTERS	2- 6	5 1/2	0	0.0	N	TEKTRONIX INC	30- 55	51 1/4	-1	-1.9											
A	GREYHOUND COMPUTER	3- 6	4 1/4	0	0.0	O	TCC INC	1- 1	1/4	- 1/8	-33.3	N	TELEX	3- 8	4 7/8	+ 3/4	+18.1											
A	ITFL	4- 12	6 1/2	- 1/4	-3.7	O	TYMSHARE INC	6- 13	12 5/8	0	0.0	O	WANGCO INC	7- 13	13	- 1/4	-1.8											
N	LFASCO CORP	8- 18	12 5/8	+ 1/8	+1.0	A	UNITED DATA CENTER	3- 6	3 1/2	0	0.0	O	WILTEK INC	8- 18	8 1/4	- 1/2	-5.7											
O	LEASPCAP CORP	1- 8	1 3/8	- 1/4	-15.3	N	URS SYSTEMS	4- 8	4 5/8	-3/8	-7.5	SUPPLIES & ACCESSORIES																
O	ELECTRO MGT INC	1- 2	1/2	- 1/8	-20.0	N	WYLY CORP	4- 11	5 1/4	0	0.0	O	BALTIMORE BUS FORMS	5- 9	5 7/8	+ 1/8	+2.1											
O	NRG INC	5- 15	5 5/8	+ 3/8	+7.1	PERIPHERALS & SUBSYSTEMS												A	RAPPY WRIGHT	6- 13	7 7/8	+ 1/8	+1.6					
A	PIONEER TEX CORP	5- 8	5 3/8	- 5/8	-10.4	N	ANDRESSOGRAPH-MULT	12- 34	15 3/8	- 1/8	-0.8	A	DATA DOCUMENTS	17- 26	24 1/4	0	0.0	O	DUPLEX PRODUCTS INC	7- 10	9	- 1/8	-1.3					
O-R-O-N																		N	ENNIS BUS. FORMS	5- 8	6	- 3/8	-5.8					
O-R-O-N																		O	GRAPHAM MAGNETICS	9- 20	14 1/4	- 1/2	-3.3					
O-R-O-N																		O	GRAPHIC CONTROLS	4- 12	9 3/4	+ 1/8	+1.2					
O-R-O-N																		N	3M COMPANY	78- 91	88 7/8	- 5/8	-0.6					
O-R-O-N																		O	MOORE CORP LTO	53- 61	60 1/2	+ 3/4	+1.2					
O-R-O-N																		A	NASHUA CORP	42- 54	51	+ 1/8	+0.2					
O-R-O-N																		O	REYNOLDS & REYNOLD	40- 51	41 3/4	-1 1/2	-3.4					
O-R-O-N																		O	STANADHO REGISTER	14- 20	16 1/4	- 1/2	-2.9					
O-R-O-N																		O	TAR PRODUCTS CO	8- 23	11 1/2	0	0.0					
O-R-O-N																		N	UAPCO	15- 23	17 1/2	- 1/8	-0.7					
O-R-O-N																		A	WARASH MAGNETICS	5- 8	7 1/8	- 1/8	-1.7					
O-R-O-N																		N	WALLACE BUS FORMS	15- 26	20 1/4	- 1/4	-1.1					
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